The Chemical Age

A Weekly Journal Devoted to Industrial & Engineering Chemistry

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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Other communications relating to advertisements or general matters should be addressed to the Manager.

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Organisation

WE hear on every side the most satisfactory accounts of the work of Mr. John Gray as President of the Society of Chemical Industry. Mr. Gray, we understand, is now engaged in a "visitation"—if that is not too episcopal a term—of the various sections of the Society, and his visits to London and other centres have already produced a sensible quickening of interest. In an interview published in THE CHEMICAL AGE of August 9 Mr. Gray briefly outlined his own policy. "I believe," he said, "although the work accomplished during the last thirty years has been great, we have still a long way to go. Our membership, gratifying though it be, should be much larger. We ought to consolidate a great deal of the work we have in hand, while, of course, not overlooking the importance of progress and development. Then we should work for the much closer association of pure science and industry, though the tendency towards this has been very apparent for some years now. . . . I believe that the continued success of the Society and the increase of its membership and usefulness are closely bound up with the energy and progressive policy of the local sections. It is extremely important that their activities should be encouraged. Every effort must be made to secure and hold the interest of the young man keen on advancing in his profession. It is my intention during the coming year to visit as many of the local sections as I possibly can; I shall, in fact, try to visit them all." At the present rate of progress Mr. Gray promises to complete this task, with excellent results to every one of the sections.

The central organisation of industries, to which so much attention is now being given, proceeds on the general principle—every workman in his union and every employer in his association. The Society of Chemical Industry is not, of course, a mere association of employers, though every employer in the industry ought to belong to it. It is far more than that. It stands for the merging of the scientific and commercial sides of perhaps the most vital to national progress of all our national industries. On this point the narrower interests labelled "Capital" and "Labour" have a good deal to recognise. The less thoughtful and especially the half-cultured spokesmen of Labour cheerfully assume that they are exclusively the wealth producers, and Capital too often accepts the view that if it can come to terms with the trade union organisations about wages and hours its own future is comfortably assured. Both omit from their vision the great class one branch of which work out of sight in the laboratory, their minds dedicated to the unceasing pursuit of new knowledge, and the other branch of which is constantly seeking to bring this new knowledge to the service of mankind. The view that Labour is the sole producer of wealth or indeed of the necessities of existence is one of those easy platitudes which serve well enough on the platform, but will not bear examination. The creative minds at the back are those of the scientist, the inventor, the engineer, the discoverer of new chemical processes. Any one of these may at any moment, by lighting upon some long-sought-for secret of Nature, revolutionise an existing industry and bring some new blessing or comfort to mankind. These are the types of mind by which civilisation is advanced from stage to stage, and though Capital and Labour are essential co-operators in the application of new inventions and discoveries—that is, in the "commercialisation" of knowledge—they are really dependent on and subservient to the creative work of the scientist in the background. In the Society of Chemical Industry, unlike the cheap political and economic teaching of the moment, this co-operative aspect of the chemical

industry is recognised; it represents common ground for the capitalist, the scientist, the commercial organiser, and the technologist, and the more complete its inclusion of all these classes the more effectively it will do its work both for the industry and for the nation.

One object of Mr. Gray's mission, one may assume, is an enlargement of the Society's membership. It is large already and its organisation covers the whole country. But there is room still for extension, and extension means increased resources and influence—available for the services of chemical industry whenever they may be required. As Mr. Gray says, the work of development depends on the activity of the various sections, and if the President's visitation results in an infusion of new energy throughout the whole organisation of the Society one may expect to hear a very good account of his stewardship when the next annual meeting comes round. In the meantime it is pleasant to hear of the hearty response which is being made to Mr. Gray's leadership in every quarter, and the readiness expressed to give him every support in his excellent forward movement.

The U.S. Bureau of Mines

THE United States provides an admirable example of the systematic organisation of research institutes. In this country we have practically nothing to compare, in the way of official or semi-official literature, with the bulletins which are periodically issued by the U.S. Bureau of Mines and other experimental stations. Moreover, in America the movement is continually growing, and it is to be noted that a new laboratory, costing about a million dollars, was dedicated about two months ago to the service of the public at Pittsburgh by the U.S. Bureau of Mines. This institution first came into being for the purpose of examining the causes of, and so preventing, the severe mining disasters which were common in America in the early part of this century, and at the present time no fewer than eleven stations are at work on these and kindred problems. All these stations have been established since 1908, and are located at all important mining and metallurgical centres. The problems attacked, in fact, vary from coal mining in all its phases, to the metallurgy and concentration of various mineral ores, and problems connected with petroleum, natural gas and clays. The Pittsburgh station is, perhaps, the most famous, partly on account of the fact that it was the first to be established, and also for the reason that with it is associated the name of that noteworthy worker, Dr. Dorsey A. Lyon. Dr. Lyon presides at the head of affairs, and under his direction systemisation of research is arranged and duplication avoided.

In order to eliminate routine work by investigators, the station has a corps of draughtsmen, photographers, computers and clerks, who co-operate with the technical specialists in the design of special equipment, in the collation of notes, and in the preparation of data and illustrations for reports. A well-equipped instrument shop is also provided, and this is manned by tool-makers and glass-blowers capable of turning out any scientific equipment. In addition to routine work of this kind, the photographic department is equipped and manned to take, develop and exhibit motion pictures, thus constituting an important element in the Bureau's educational campaign for promoting safety and health among miners. America was the first nation to recognise seriously the educational value of the film, and the Bureau's equipment now numbers about 150 reels which are available for public exhibition. So far as fuel economy is concerned, investigations are in the hands of a special fuel-efficiency section, which is itself sub-divided so as to deal with the different varieties of fuel and the various mechanical means of utilising them. In fact, the activities of the Bureau are unlimited, and those who are particularly interested in the details of the work and the equipment would do well to read the very full description of the Pittsburgh station which is given in the first October number of our American contemporary *Chemical and Metallurgical Engineering*.

On the score of research and the means for carrying it out comparisons between this country and America are odious; but it is at least some cause for gratification to find that the action of the British Association, and the general demand at the Bournemouth meeting that the Government should foster scientfic investigation, appears to be bearing some fruit. It is said that the Association has heard from the Admiralty on the matter, and that the authorities are "keenly alive" to the supreme importance of research and its bearing upon the problems confronting the Navy. In fact, the *Times* says that the organisation of suitable arrangements for this purpose is now engaging the "earnest attention" of the Admiralty, that rapid progress is now being made in the elaboration of a complete scheme, which will provide, on the one hand, for the systematic and continuous development of experimental establishments, and on the other hand, for an effective relation between those establishments and the scientific institutions throughout the country. Evidently, therefore, the Admiralty feels like business, and if words are translated into action, it is to be hoped that the other Governmental departments will be persuaded to follow suit.

Government Chemists' Salaries

THE Canadian Institute of Chemistry is resolutely tackling the Dominion Government, the largest employer of chemists in Canada, on the question of the salaries paid to chemists in the Canadian Civil Service. In a memorial addressed to the Civil Service Commission, the Institute quotes the following table of salaries to show the unfavourable position of the chemist, as compared with other scientifically trained civil servants:—

Assistant Chemist	$1320—1680
,, Ceramist	1680—2160
,, Zoologist	1680—2400
,, Geologist	1680—2400

and it strongly urges the adoption of the following schedule of salaries "as being more in accord with the compensation received by chemists who are not in the service of the Government":—

Laboratory Assistant	$ 900—1500
Junior Chemist	1860—2100
Assistant Chemist	2220—2700
Associate Chemist	2760—3300
Chemist	3300—4200
Chief Chemist	3600—5100 and up.

It cannot be argued, the Institute asserts, that a chemist has had a shorter or less rigid course of training than any of the other professional men named, and if chemists are to receive salaries lower than those of geologists, ceramists, zoologists, &c., the inevitable result will be the avoidance of the Civil Service by the more capable and ambitious men of the profession. The Institute frankly expresses its surprise and regret that at a time when there is a widespread demand for scientific and industrial research—to which the chemist has made contributions second to none—the Civil Service Commission has failed to grant to the chemical profession even that recognition extended to others of like attainments, and it asks for a levelling up of chemists' salaries to the level of the scale quoted above, which was drawn up by the Ottawa Branch of the Society of Chemical Industry.

The Peacemaker

IT is usual to associate with the award of Nobel Prizes services of a distinguished character to the cause of international peace, and the announcement that the Nobel Prize for chemistry in 1918 goes to Professor F. Haber, of Berlin, may at first produce some slight shock. There is certainly a touch of irony in the fact that research which may indeed have been intended to benefit mankind should have been turned so disastrously to the service of war. We must, however, be prepared to distinguish between the scientific merit of Professor Haber's work and the evil uses to which the results of that work have been perverted by others. Remarkable as the work of our own chemists has been during the war, it is still a subject almost for shame that so humane a science as chemistry, which in the medical field, for example, has done so much to alleviate suffering, should be forced to serve the altar of war. Proud as our chemists, as scientists, are of their work during the war, there can hardly be one who does not regret the tragic necessity which called for their efforts, and one may hope that the German scientists who instituted or at least assented to chemical warfare are not without some feelings of compunction. So far as Professor Haber's work as a chemist is concerned none will grudge him his reward, and we may say the same, in a sense, of German chemical enterprise generally. The recent addresses, based on visits to the Rhineland Works, show many admirable points in the German scientific and industrial organisation. Their industry, their science, their commercial machinery are all good in themselves; where they went so hopelessly wrong was in turning these intrinsically good things to such villainous ends. They will be in the end none the worse themselves for their bitter experience, and other nations will lose nothing either by remembering the spirit which turned to ashes Germany's, at one time, brilliant world prospects.

The Transport Problem

THE complaint which Mr. G. E. Howard (of Messrs. Howard & Sons, chemical manufacturers, of Ilford) makes in the *Times* is one with which a large number of chemical firms will sympathise. "Every day," he writes, "we receive letters from customers all over the country bitterly complaining of delays in delivery of our goods. To-day we think the record has been broken, since we hear from Wakefield that a small consignment of chemicals dispatched from here by us on June 12 reached its destination on November 24. What the result would be of nationalising the railways and placing the organisation completely into the hands of Government officials, one hardly dares to contemplate." On Wednesday again, in the House of Commons, attention was called to the serious effect produced on the caustic soda and bleaching powder plants of the United Alkali Co. of Widnes by lack of railway transport of lime from Buxton. This question of transport is one of growing importance to every industry. There are urgent calls for increased production on every side, but the value of increased output would be largely lost without a corresponding improvement in the means of distribution, and at present our distributive facilities are unequal to the existing volume of business. Of late years there has been considerable improvement in the methods of handling materials and finished products in works, but we now want to see our railway, motor, and shipping services reorganised to meet the new demands of trade. While cost of transport, whether by road, rail or sea, has gone up appreciably and threatens to go up still more, the efficiency of the service has declined to at least an equal extent, and, as Mr. Howard shows, the chemical trade is among the sufferers. Increased cost is a condition to which we are getting gradually accustomed; what is urgently wanted is a speeding-up of transport. Our railways, in their present state of organisation, are unequal to the strain, and a large development of transport service by road would seem to supply the best prospect of relief. Our experience during the recent railway strike was a lesson in the possibilities in this direction.

The Calendar

Dec.		
9	"Centrifugal Dryers and Separators." A. E. Alliott, B.Sc. (Manlove, Alliott & Co., Ltd.)	College of Technology, Manchester.
9	Society of Chemical Industry (Edinburgh and East of Scotland Section). "The Oxidation of Ammonia." Dr. J. Knox.	Edinburgh.
9	Sheffield Association of Metallurgists and Metallurgical Chemists. "The Treatment of Large Forgings." A. P. Hague, Assoc. Met.	Royal Victoria Hotel Assembly Room, Sheffield.
11	Society of Chemical Industry (Birmingham and Midland Section). "Influence of Temperature, Concentration, Duration of Mash, and Slackness of Malt, on the Starch Products of the Extract of Malt." James O'Sullivan, F.I.C.	University Buildings, Birmingham
11	Society of Chemical Industry (Bristol & South Wales Section): "Fractional Distillation in the Laboratory and in Practice." W. R. Bird.	Chemical Department, Bristol University.
11	Association of Engineering and Shipbuilding Draughtsmen: "Motor-Driven Machinery." W. A. Toppin, A.M.I.E.E.	Grammar School, Chesterfield.
13	North of England Institute of Mining and Mechanical Engineers. General Meeting.	Newcastle.

Sodium Cyanide Production

An Account of an American Plant Organised for War Purposes

By permission of the Chief of Ordnance, U.S.A., Major C. O. Brown has published an interesting description of the chemical plant organised at Saltville, Virginia, during the war, for the production of sodium cyanide in quantity. Owing to the conclusion of hostilities only a few days after the plant was complete, no attempt was made at production in the mass quantities originally contemplated, but the experimental work produced results well worth recording. The work was under the direction of Dr. Charles L. Parsons, chief chemist to the U.S. Bureau of Mines.

THE U.S. Bureau of Mines, in the early part of 1917, realised the importance to the War Department of an extensive chemical organisation with adequate facilities for developing those materials necessary to the warfare programme of the Army and Navy. Particularly, the toxic gas programme needed far-reaching investigation, development, and production of large proportions. During this work it became apparent that sodium cyanide would be a necessity as a constituent in one or more of the toxic materials desired. Study of the classification of all raw materials in the country showed that sodium cyanide should, if possible, be produced by a nitrogen fixation method rather than by the sodamide-ammonia process. The destruction of ammonia to furnish the combined nitrogen was to be avoided by all means. This directed attention to the Bucher process for the production of sodium cyanide from soda ash, coke and atmospheric nitrogen by the use of iron as a catalyst. This process was being developed by the Nitrogen Products Company, Providence, Rhode Island.

In the latter part of 1917 the War Department requested the Bureau of Mines to develop a plant for producing 5 tons of sodium cyanide per day along the lines of the process of the Nitrogen Products Company. Owing to the progress of gas warfare, after the design was well along, the plant was increased to 10 tons per day. The policy adopted in designing the plant was to adhere as closely as possible to the demonstrated design used by the Nitrogen Products Company. The equipment of this company, however, was not fully developed, and it was necessary to try to add such improvements as would ensure and safeguard the success of a project of this size. A good deal of experimental work was done in a rapid but efficient manner during the design of the plant, to give the engineers the data necessary for some of the more radical decisions and changes. A complete unit with a horizontally tipped rotating retort for making cyanide was set up to determine if the stationary, vertical retort formerly used in this work should be abandoned. This work indicated several slight advantages over the stationary retort, but the advantages were not so positive as to justify its use. The data on the stationary retort were quite extensive, and it seemed apparent that it would function in at least an acceptable manner.

The reaction for producing cyanide is primarily a difficult one, and the undeveloped state of the art required that a maximum amount of care be used in selecting a *personnel* that would insure success. By good chance, unusual means were at the disposal of the Bureau of Mines for locating and obtaining chemists of the Junior Grade, and the War Department co-operated in placing these men in the organisation at Saltville. A school for their systematic training and development was opened up, and equipped with an actual unit of plant equipment; in some cases the equipment of the Nitrogen Product Company was utilised. The product worked upon in this training was supplied by the Company's experimental plant. As a result of this training, which was participated in by both officers and enlisted men, a nucleus of five officers and 78 enlisted men was developed for the permanent organisation. When the plant was ready for operation, a complete organisation was ready, from guards to cost accountants. The organisation allowed the plant work, which was purely technical, to be conducted in three shifts of eight hours each.

The works cover approximately forty acres. The plant or process buildings are of substantial steel and concrete construction. The other eighty odd buildings are semi-permanent wooden frame buildings. A filtration plant provides clear and sterile water for drinking and all domestic purposes. The larger bulk of water used in the process, as jacket water and condenser water, is settled to some extent by a reservoir back of a dam in the river, constructed to house the intakes for the water system. A boiler plant provides 1,200 boiler horse-power, furnishing steam for process requirements and steam to generate electric power sufficient to carry the entire plant load. The turbine room is equipped with three direct-connected turbo-generators. It was fortunate this provision was made, because, owing to a burn-out in the high voltage transformers of the substation, the power plant was obliged to carry the plant load and furnish current for general uses for the entire period of activities.

The Process

The process is divided into three stages: (1) The mechanical preparation of the material treated in the retorts; (2) the treating of the briquetted soda ash-iron-coke mixture with nitrogen at 1,000°C.; (3) the extracting of the cyanide as sodium cyanide from the cyanised briquettes produced in the preceding stage of the process. The barren briquettes, after recovery of the cyanide, are returned to the mechanical preparation building where they are re-ground, brought back to their original composition, and remade.

The mechanical preparation building was two storeys high, with a monitor permitting the installation of vertical dryers 55 ft. high. In this building the raw coke was crushed to pea size, fed to the tube mills (where it was mixed with a small amount of finely powdered iron) for further grinding in intimate mixture until both materials passed at least 150 to 200 mesh. The larger proportion of this mixture passed through 200 mesh and was conveyed to storage. From storage a certain amount of this iron-coke material, with the proper percentage of soda ash, was dry mixed and then elevated to wet mixers for kneading into a doughy plastic mass, and the material extruded as briquettes while still hot. The briquettes were then dried by the exit flue gases from the retort furnaces.

In the retort department, in which the second stage of the process was carried out, there were 144 separate units consolidated with eight banks of 18 units each. Two Morgan gas producers, located very close to the furnaces, supplied the fuel used. One main flue ran through the centre of the retort building, a length of 180 ft. Four banks of furnaces were grouped on each side of, and drew gas from, this central flue. The retort furnaces were radically different in design and arrangement from any furnaces previously used, having been extensively modified with the object of increasing the life of the iron retorts used in the furnaces. The replacement of iron retorts had formerly been a source of heavy expense, each retort lasting only from seven to 12 days. This objection was also met in another way—viz., by the use of nichrome retorts. Much effort was devoted to those furnaces equipped with nichrome retorts, so that the actual increase in the life of iron retorts brought about by this special furnace is uncertain. While no iron retorts actually failed in service, owing to the frequency of uncontrollable factors necessitating shut-downs for other reasons, indications pointed to a useful life of 11 to 14 days per retort in these furnaces.

Labour-saving Devices

Convenient labour-saving devices were installed throughout the building for handling the feed to the retorts and disposing of the cyanised briquettes. After coming through the retorts, the briquettes passed through the feeder into a cooling can where the cold nitrogen was entered. The nitrogen passed up through the material in this cooling can into the retort where combination with the briquettes was effected. The carbon monoxide burned at the top of the retorts as in previous practice, no effort being made to utilse this heat beyond its usefulness as a pilot to indicate the behaviour of the tube. Each furnace was separate in the bank, having an individual burner control apparatus, but one retort tube, an individual pyrometer and damper controlling the exit gas passage into a flue common to the entire bank of 18 furnaces. The pyrometers registering the heat conditions of the retorts were grouped in sets of nine

and connected to an automatic recording instrument for permanent record. Accurate temperature control was very important to the successful operation of the retort. When a retort burned out the gas was cut off from the furnace and the work of putting in a new retort commenced. This work was completed with as little delay as possible to prevent the cooling-off of the furnace, but this depended on the nature of the break in the retort and the success attending the pulling of the retort from the furnace. It happened sometimes that a retort could be replaced by three men in four hours, while in other cases a day would be necessary to complete the job. Facilities for this work were developed by the engineer officers and the changing of retorts in this plant became a much smaller drawback.

In the recovery building in which the third stage of the process took place, the briquettes were dumped from an overhead mono-rail system into the leaching apparatus. Each unit of the lixiviating equipment held 1,000 lb. of cyanised briquettes, and when loaded the apparatus was closed and evacuated until all the entrained air possible of removal had been pumped out. The leaching of the cyanide was next accomplished by a process developed by the Nitrogen Products Company, using liquid anhydrous ammonia, which was pumped through the briquettes in three units on the counter-current principle to extract the cyanide, while leaving the briquette structure substantially unimpaired. This permits complete extraction. On account of the vapour pressure of liquid ammonia, the entire system had to withstand 250 lb. to 300 lb. pressure. The ammonia saturated with cyanide passed into a header common to twelve units, and from this header was distributed to anyone of six evaporators.

The Evaporation System

The evaporators were steel, steam-jacketed cylinders placed horizontally and individually equipped with motor-driven agitators and extruders. The cyanide was thus produced in a powdered form and discharged mechanically, when dry, directly into the final shipping container. This procedure saved the workmen a great deal of handling and exposure to danger. The control of this entire operation just described lies in the evaporator and the steam jackets on both lixiviators and evaporators. When a lixiviator full of saturated ammonia was obtained, the first lixiviator of the three, now stripped of sodium cyanide, was cut out of the cycle, and the ammonia in it driven into the second unit by entering steam in the jacket. The surplus ammonia was driven out completely by the following procedure: The saturated ammonia solution was sent to an evaporator, heated by the steam jacket, and the rate of flow of the solution into the evaporator so regulated that the evaporated ammonia leaving the evaporator had accumulated several degrees of super heat, which was used by passing it up through the first lixiviator, in direct contact with the ammonia-wet briquettes, evaporating this entrained ammonia and leaving practically ammonia-free, cyanide-free material. The ammonia atmosphere remaining in the lixiviator was drawn out by passing air through the apparatus and then treatment of the air by scrubbing with water. The cyanide produced in the evaporator was stirred and heated until all ammonia was expelled and a vacuum would hold on the unit in question for five minutes. Then cooling water in the jacket reduced the temperature of the cyanide so that it could be packed. The leached briquettes were returned for use.

This department was the most complex and received the largest amount of development by the chemical engineers. In spite of the many and grave uncertainties of this recovery, the equipment worked well, and costs and ammonia losses were much less than expected. Experience showed that 1 lb. of ammonia was lost mechanically for 50 lb. of cyanide produced. The ammonia solution made in the scrubber was recovered and returned to the anhydrous ammonia storage. There were two 10-ton capacity refrigerating machines in the equipment, but the most of the ammonia recovery was done by the absorption system. The design of all the equipment in this department was largely the work of the staff, but especially was this true of the evaporators. They received considerable experimental attention before closing the design and in operation succeeded beautifully in producing powdered cyanide. The design of this evaporator, however, is open to still further improvement, as is also the case with the retort furnaces, but unquestionably this equipment offers an advance in the technique of the art.

The Claude Process

The nitrogen for this process was obtained by the Claude process from the atmosphere. The nitrogen building contained two complete caustic scrubbers and compressors, either compressor, or both, supplying any one or more of the three Claude towers installed. This equipment made a consistent, uniform record for performance and produced pure, dry nitrogen with remarkable reliability. The method of analysis for nitrogen, to detect impurities of 0·01 per cent. (not considering argon and other rare gases), was quite difficult and had to be executed with care, but by developing a special self-contained apparatus embodying all precautions for conditioning the gas sample, it was felt by the Research Director that reliance could be placed on the reported analyses, giving 99·99 per cent. and 100 per cent. as the usual purity of the nitrogen. The nitrogen columns proper functioned excellently, running as high as 45 days without trouble or deriming.

Owing to the termination of hostilities only a few days after the plant was ready to start operation, no attempt was made at capacity production. For the purpose of making justifiable reports on the equipment and securing such data as was possible regarding costs and defects in the plant as a whole, one bank of furnaces, with an equivalent amount of equipment in the other departments, was operated In general, the plant is well balanced, one department fitting very closely to other departments as to capacity and smoothness of operation. Development on this process, however, has never stopped, and will not stop with this plant, so that the flow sheet in a given department to-day may be warped and out of balance to-morrow.

Operating Problems

During the short time of operating, many troubles were remedied and such cost data and technical data secured as was possible. In the mechanical preparation of the briquettes most of the troubles were of a minor sort and their correction easy. It was proposed to make up the carbon used in the process with a special pitch coke which contained practically no ash. It was desired to use the briquettes over and over again, and this coke would permit such a practice, as the ash in the briquettes would not accumulate. But it was appreciated for the first time that some ash, 3 to 5 per cent., was beneficial to the perosity and hardness of the briquettes and that the original stock should be made from petroleum or foundry coke and then the accumulation of higher percentages of ash prevented by using pitch coke as a "make up" material. The briquettes were loaded on metal trays for drying, each tray containing about 60 lb. of dried stock. This practice should be abandoned and a continuous conveyor dryer used. The up-keep and handling of the trays is prohibitive.

In the retort department several operating problems presented themselves and some serious defects in the design. The principle of the retort tube is bad from an engineering standpoint, because it will not permit of reasonable sized units. The furnace equipment will accommodate only one retort, the troubles in feeding the material are uncertain and hard to correct in the limited space of the retort, and finally there is too much investment per furnace for the amount of material produced per unit. These comments, of course, must not be considered as having any bearing on the work of the Bureau of Mines, for the reason that the limitations of this type of furnace were well known to the engineers on starting the work. But there was no time to develop another type of furnace, although one profitable and quite extensive experiment was carried out during the early stage of the design. The fuel required for a retort amounted to over 70 lb. of coal, as producer gas, per hour. Recommendations now on file, changing the furnaces still more, would reduce this to approximately 40 lb. of coal on the same basis, but when it is possible to produce only 7·5 lb. of cyanide during this hour, this cannot be considered economical heating. The cost of retorts per pound of cyanide is nearly 1·9 cents when using iron, and apparently nearly as much when using nichrome, although the true possibilities of cast nichrome are not unquestionably settled.

The hardness of the briquettes is an important point, because when dust-free (dust and fines are produced mostly by handling) the extraction is much easier and the mechanical ammonia loss much less. Experiments to control this factor resulted in an economical and most efficient binder, sodium aluminate; but unfortunately this material, even in the small amounts used, caused serious feeding difficulties. This was further shown

when using a special retort that had been "calorised," a process impregnating the metal surface with aluminium. In this case continual feeding trouble was encountered. There was a shrinkage of the material during treatment in the retort of about 22 per cent. This was due to a change in specific volume and also in specific gravity of the material. The concentrations of sodium cyanide produced varied, but averaged 20 per cent. The amount of shrinkage of the briquettes altered this concentration figure. As high as 30 per cent. sodium cyanide has been made, but when the original proportion of soda ash is sufficient to produce this concentration of cyanide, the briquettes are extremely hard to handle. It is also doubtful if actual economy, either in the broad sense or from the standpoint of increased production alone, results from developing more than 20 per cent. sodium cyanide.

Tabulated Results

In the recovery department the difficulties were largely mechanical and quite unimportant. The purity of the sodium cyanide produced averages 92 per cent., but it is practically free from alkali, iron and insoluble matter, the main impurity being carbonates. After the first pot produced, the material was nearly pure white, needing no purification before marketing.

Cost per Pound Sodium Cyanide.

	Raw Materials. Cents.		All Other Charges. Cents.
Mechanical Preparation	2·32	...	3·41
Retort Department	2·39	...	8·85
Recovery Department	0·75	...	2·83
Laboratory	—	...	0·23
Totals	5·46	...	15·32
			5·46
GRAND TOTAL			20·78

Analysis of Cost in Terms of the Work Performed.

Item.	Cost per lb. of NaCN.		Per cent. of Total Cost.
Raw Materials	7·4082	...	37·30
Power	1·5986	...	7·95
Steam (not used as power)	0·3038	...	1·51
Direct Labour	4·5410	...	22·59
Indirect Labour	0·4025	...	2·00
Retort Tubes	1·9300	...	9·60
Repairs	0·822	...	4·10
Depreciation	1·1800	...	5·87
Contingencies (10 per cent.)	1·8260	...	9·08
TOTALS	20·1021		100·00

The cost of making cyanide, applied exclusively to this plant, was roughly 20 cents per lb., calculated in the usual standard manner of cost accounting to include all charges except royalties and profits. This figure, however, would have no particular significance as to the cost of making cyanide at this plant if costs were reduced to a reasonable basis by virtue of constant operation at capacity. The nitrogen produced by the Claude process at about 25 cents per 1,000 cubic feet could be positively reduced to about 10 cents per 1,000 cubic feet if the capacity of the plant were required. The preceding brief tables show the cost in cents per pound of 100 per cent. sodium cyanide by departments. These two results are not derived from the same data, but are independent observations, and while disagreeing slightly, are still a notable check on 20 to 21 cents as the cost per pound.

The American "Chemical Age"

WE extend our sympathy to *The Chemical Age* of New York, a new journal started almost simultaneously with our own (though neither enterprise was known to the other) and having similar aims. Owing to the New York printers' strike our contemporary has been obliged, like other American journals, to suspend publication for a time. A communication received from the general manager in the classic dic.ion of America, states: "To be loyal to the Periodical Publishers' Association of which we are members, and to throw whatever influence we have against outlaw labour organisations, we must temporarily suspend publicatio.. This is a going concern and a prolonged strike will hurt us more than it will older papers blessed with greater resources, but we hope we are good Americans, and as such we join hands with our brothers in the publishing field to present a solid front to the common enemy. We believe our subscribers and our advertisers will applaud our stand and will bear with us until the present difficulty is ironed out."

Chemical Industry of France

Commercial and Economic Problems

THE renewal of trade relations with Germany is the great question of the day, especially in view of the great shortage of dyes and intermediates. The lead taken by Belgium in adopting the policy of the open door as egards enemy products has caused quite a sensation in French industrial circles. Common sense and expediency dictated this policy to Belgium because in many respects she was in the same predicament as France, lacking all the most essentia' materials vital to her industries, such as carbonate of potash, which is required in great quantities for glass-making. It is anticipated that England and America will follow suit, and France in spite of a strong moral reticence, will be forced by circumstances to follow the example of her Allies.

Prices are rising everywhere, and even war products, such as acetic acid, show the same tendency. The shortage of coal will not improve matters, and the further call made on production by the devastated provinces as they gradually come back to life will in all probability keep up prices for some time to come.

American coal is finding its way to most of the French ports. Rouen has received American and German coal and there are large stocks on the quays at Bordeaux and Le Havre. The difficulty lies in distribution, country districts being cut off from the ports. The textile industry is, in particular, severely handicapped by lack of transport facilities, cotton remaining stocked at Le Havre which should be conveyed to the looms in eastern France; more than 3,000 workers have thus been thrown out of employment. The Government is taking strong measures to put an end to the transport crisis and has appointed two committees, one to co-ordinate the activities of the different railway companies, and the other, a technical committee, to look after the efficiency of the rolling stock proper.

The French metal market is much disturbed on account of the shortage of raw materials, and it is feared that many factories will have to close down, instances of this kind having already occurred in the North of France. Firms are being driven to import from England and America, notwithstanding the unfavourable rate of exchange; with normal means of transport their requirements could be easily met from home sources, such as Lorraine.

The tendency of French metallurgy before the war was to be as self-centred as possible. The ideal which each individual company aimed at was to group together the blast furnaces, steel works and rolling mills, and to obtain command of raw materials by buying or obtaining concessions for iron and coal mines. Once this concentration had been achieved the next step was to increase and intensify production; and this was done slowly by a judicious distribution of the accumulated profits more than by any sudden increase of capital, thus leaving the latter relatively small compared with the magnitude and importance of the undertaking.

This state of things is being gradually modified as a result of the war, and the tendency now is for such big self-contained firms as Schneider & Company, La Marine, Micheville and Pont-à-Mousson to extend their spheres of action and become great banking concerns controlling many factories making finished products, navigation companies, &c. This policy first became manifest when Alsace-Lorraine was returned to the mother-country.

French metallurgists are now ousting the Germans from the splendid factories which the latter built in Lorraine, and many are giving up their former policy of gradually extending their own works to share in the riches and development of the recovered province. The present outlook is consequently one of constant fusion, absorption and amalgamation of various interests, and this is paving the way to a sort of State collectivism; owing, however, to the strongly individualistic temperament of the French, it would not be surprising if a reaction were to ensue. Meanwhile, the blast furnaces in Lorraine continue to be severely handicapped by the great shortage of coke, adequate supplies of which are dependent on good transport facilities. As a result of the recent strikes, the production of iron ore in Lorraine during September was only 440,000 against 655,000 tons in August; the quantity exported was 500,000 tons, of which 100,000 tons went to Germany.—*Journal S.C.I.*

Past and Future of the Alsatian Potash Mines

By M. Paul A. Helmer

The following article is based on a recent speech at Mulhouse on the question of Alsatian and German potash. The author, M. Paul A. Helmer, the official custodian of the potash mines of Alsace, is a well-known Alsatian avocat, who visited England more than once during the war, and who has been throughout a strenuous defender of national rights of Alsace and Lorraine.

AFTER the technical installation which has taken place in the past few months, the moment has come when the economic aspects of the potash industry have to be considered. This industry, which Germany used and abused as if it were a monopoly, must be emancipated. Freed from all shackles, it must take its place in the economic life of France, where it is a newcomer. The markets of our Allies and the Neutrals must be opened wide to it.

Capital to be Employed

Prudence and sagacity are required. The German "kali fever" must be avoided, for she looked upon potash merely as a speculation. That disease in Germany had the fatal effect of the absorption of too much capital. This caused a permanent crisis, from which the potash industry has suffered for more than 50 years, and which rages to-day in a worse form than ever. The Alsatian deposits must not be exposed to the same dangers.

A lesson can be learned from the German balance-sheets, with their fictitious assets and arbitrary valuations, with their enormous capitals which an unhealthy speculation sunk in the mines, and their mortgage loans, the proceeds of which were distributed by the mine owners unblushingly. On the other hand, only as much capital as is absolutely indispensable must be employed by the Alsatian mines.

If only the strictly necessary capital has to bear interest, the margin for the fixing of the selling prices will be all the greater, an any further capital which may be offered can be made use of in the opening of the deposits. It will thus be all the easier to compete with German potash.

Competition of German Potash

The production of potash is no longer a monopoly capable of imposing its own conditions. The future of the Alsatian mines depends on the ability and the farsightedness of their management, and the resources by means of which German potash is to be countered. For the nonce, Germany has a great advantage over Alsace, owing to the fact that her potash industry has been long established. She has gained an experience and organisation which are denied Alsace; but, nevertheless, the importance of this must not be exaggerated.

The potash industry of Germany fears the potash industry of Alsace. Alsace rises before Germany at a moment when the economic outlook in Germany is darkening through over-capitalisation, difficulties of transport, difficulties of coal and labour. Many shafts had to be shut down, others are flooded, and the remainder are unable to supply even the needs of their own country. So far, German agriculture has received but 800,000 tons, as against the 900,000 which she had consumed in the same period last year. No wonder that Germany has been compelled to decline orders from abroad, nor is it a wonder that self-interest induces Germany to try to come to an understanding with Alsace.

An Understanding with Germany

The cry of German competition has frightened even some people in Alsace, and voices have been heard to state that the best means of avoiding a struggle would be an understanding with Germany. Perhaps if these fears had manifested themselves, and if such an understanding had been claimed during the war—although such an understanding would always have been disliked by Alsace—means would have been found by stipulations in the Peace Treaty that, whilst the Alsatian mines were being fitted up and developed, a regular supply of the potash salts would have been assured. In this way Alsace would have been enabled to appear at once in the world markets, as it will a few years hence, when the mines are in full swing.

But, whatever happens, one thing is certain—there can be no new kali syndicate; that world monopoly has been fortunately destroyed. Moreover, it is not possible to agree to the negotiations as to prices. If the bait of a momentary gain was to succeed, Alsace would lose her freedom of action in those markets to which she has access by right of the Allied victories. But there would be no safety in an understanding, for the refunds—more or less secret—which Germany is in the habit of making as a sort of discount of premium point to the way in which Germany would break her pledges. Any negotiations with Germany under present conditions could have as their only win a formal recognition of the Alsatian potash industry, and a guarantee of a supply of such salts as are not yet produced in Alsace.

Organisation of the Alsatian Mines

Some time ago one of the leading men in the German potash industry, a certain Herr Wilhelm Sauer, stated that Alsace was not to be feared as a competitor, because France would not be able to create an organisation with sufficiently wide views to establish a powerful industry. Herr Sauer was a bad judge, for that same organisation of the creation of which he believed France incapable is being methodically built up. Whatever the future constitution of the mines, whoever their future owners may be, one aim must always be kept in view, and that aim is the adoption of liberal ideas both in the administration and in the working of the mines, coupled with co-operation and mutual self-help. Public interest, the preservation of great national wealth, and its utilisation for the common weal, both producers and consumers of the entire country, all demand that the potash mines of Alsace should face bravely the competitors from the other bank of the Rhine.

The mines of Alsace lend themselves admirably to a compact grouping on a limited area. The small number of working centres, the uniformity of the deposits, both in their richness and in the purity of the salts, the favourable labour and transport conditions, facilitate the establishment and continuity of an understanding between the producers. Germany did not enjoy the same advantages, and yet she succeeded in grouping nearly all her mines into half a dozen concerns. No excuse would then avail if Alsace did not try to profit by all the advantages Nature bestowed on her so generously. The co-ordination of the mining districts of Upper Alsace which is being methodically studied will shortly be completed. Already the sales centralisation so indispensable in the fight against the German kali syndicate allows the Alsatian mines to enter the world market as one whole.

Plans are being worked out in common which, by a fair and well-thought-out advertising campaign, will show the superiority of the Alsatian production, and on the basis of world-wide experiments, indicate the best methods of employing Alsatian fertilisers.

For the solution of labour questions a collective contract has been recently concluded with the Miners' Union. It is applicable to the entire potash industry of Alsace, and will necessarily have as a consequence the creation of an Employers' Union. The struggle against the high cost of living which, singly, the mines could not carry on successfully, led a short time ago to the formation of a co-operative society which includes all the workers of the mining district, the first results of which warrant the brightest hopes. With a view to attracting more workers who will be wanted as the industry increases, it will be necessary to create labour colonies, with which the mines will again have to come to an understanding.

The common supply of motive power and raw materials, the standardisation of working methods, the introduction of uniform accountancy principles, will create between the various centres of production a solidarity which must strengthen as well as promote the well-being of every mining field.

In conclusion, an industry of such importance requires a centre for research and experiments; a central organisation where directors, engineers and chemical analysts of the entire district can supply at any moment all the required technical, chemical and commercial information.

Reviews

THE PROFESSION OF CHEMISTRY. By Richard B. Pilcher. London: Constable & Co., Ltd. Pp. 199. 6s. 6d. net.

The unsatisfactory position of the chemist is due to many causes, but those who have tried to improve it soon realise that the most important consideration is the abysmal ignorance of the general public, even the well-educated public, of the training and function of a chemist. "The Profession of Chemistry," though written primarily as a guide to those desirous of entering the profession, should do much to dispel this ignorance. At last there is a reliable account of the training and work of the chemist which can be placed in the hands of those who still think he sells tooth-brushes. Chemists should be grateful to Mr. Pilcher for the pains he has taken in compiling this book from his unique experience gained during over 25 years' association with the Institute of Chemistry.

The training described is founded on that laid down by the Institute for candidates for its diploma. Although this has been prescribed as the result of the experience of many of the foremost men in all branches of the profession, there is considerable feeling in some quarters that it is not satisfactory, more particularly on the technical side. The matter requires careful reconsideration in the immediate future; but there is a danger, not to be overlooked, of encouraging the acquisition of so-called "useful" knowledge at the expense of sound acquaintance with principles, of regarding chemistry as a handicraft, not as a science. One is glad to see that the author, while asking for more time for the study of science in schools, is fully alive to the importance of literary subjects as the basis of a general education, though it is to be regretted that the importance of a knowledge of German, of the Calculus, and in some cases of geology or the biological sciences, is not more emphasised.

The prospects held out to the young chemist in a chapter under that heading are not too alluring, but the author has, perhaps, wisely erred on the side of caution; the average salary of the young chemist is now rather over than under £300 per annum. The various openings for the chemist are enumerated, and the general nature of the work in the various branches of the profession briefly indicated.

To chemists, apart from students, the sections which are of the greatest interest are those on the title "chemist," professional organisation, professional procedure, chemistry and the State and chemists in war. Under these headings many controversial questions are touched upon with a fairness and sympathy which even those who do not hold the author's views will appreciate. The chapter on the title "Chemist"—the result of much work and reading—should appeal to those who are anxious for a legal re-definition of the term, as it constitutes an excellent case, epitomising the history of the word and repudiating the claim of the pharmacists to its exclusive use.

The statement which gives, perhaps, the most food for reflection is that on the position of the chemist in Germany on page 94. It will come as a surprise to many, yet it is undoubtedly correct. It may be that the best method for raising the status of the chemist in this country is to educate the bulk of the nation to appreciate brains rather than money—a colossal task.

O. L. B.

ALCOHOL: ITS PRODUCTION, PROPERTIES, CHEMISTRY AND INDUSTRIAL APPLICATIONS, WITH CHAPTERS ON METHYL ALCOHOL, FUSEL OIL AND SPIRITUOUS BEVERAGES. By Charles Simmonds, B.Sc., Analyst in the Government Laboratory, London. MacMillan & Co., Ltd., London, 1919. Pp. xx., 574. 21s. net.

From the subsidiary titles of this book it might be judged that the author's intention was to produce a comprehensive volume, and after a careful perusal of its pages we may say that he has succeeded. The text is divided into 12 chapters, incorporated with which are the most modern tables and physical constants relevant to the whole subject of alcohol and alcoholic beverages. There is an excellent bibliography and a name and subject index. Reference should also be made to an "Addendum" on alcohol as motor fuel.

A succinct outline is given of the production of alcohol, and among the sources from which it may be obtained the author includes synthetic methods from hydrocarbons, which he states are emerging out of the experimental stage. In reference to the production of alcohol by fermentation, we may point out that the average starch content of the different cereals which he quotes is too high, even if they refer to the dry materials. 60% is about the maximum percentage present in barley, whilst the value given for dry malt (68 per cent.) is far above the maximum. Indeed, malt must necessarily contain less, not more, starch than the barley from which it has been made (cf. Ling, *J. Inst. Brewing*, 1919, 288). Cane molasses is said to contain 52-67 per cent., calculated at "dextrose," which should read "invert sugar," although it must be conceded that other *unknown* reducing sugars are present. The production of alcohol from wood is dealt with in a manner quite useful and suggestive to the manufacturer, and the author, after discussing yields, comes to the conclusion that "wood waste must be considered a very important raw material for the potential production of alcohol in well-timbered countries."

The short account of the malting process is on the whole accurate; but it is not quite correct to describe brewery malt as "short" and distillery malt as "long" on account of the relative length of the germination period in each case. As the author truly says, the distiller's object is to produce the maximum diastatic power, but this is not accomplished so much by "long" germination as by the particular conditions of germination, especially efficient withering and the concomitant auto-digestion. The various forms of rectifying stills are described clearly and concisely.

The chapter on the general chemistry of the alcohols is an excellent summary, as are also those on the physical properties of methyl and ethyl alcohols. The portion of the book dealing with analysis is one of its most valuable features, and is well up to date. We may specially mention the inclusion of the very useful table taken from the Bureau of Standards, Washington (Circular No. 19), giving the densities of mixtures of alcohol and water at temperatures from 10–40°C. In the illustration on p. 306 of a battery of distilling apparatus for the estimation of methyl alcohol in wood naphtha, the receiving tube should incline upwards, not downwards, from the flask to the condenser, so that it acts as a trap to prevent the spray from being carried over; and the same applies to the "original gravity" still on p. 467, but not to the apparatus on p. 309.

On the subject of industrial alcohol, we cannot quite agree with the author that "the manufacturing operations requiring ethyl alcohol are practically non-existent, in which either a neutral substance, such as benzene, acetone or petroleum cannot be employed as a denaturant." We submit that there is or should be a considerable demand for pure ethyl alcohol among manufacturers in this country. The concession granted to teaching institutions in this connection is one that we should not like to see removed; but no one can deny that it is at least of equal national importance to extend the same privilege to those industries dealing with the manufacture of fine chemicals. In fact, the numerous ethyl derivatives, the preparation of which is described in the book, may be cited as ample justification for this demand.

"Spirituous beverages" are dealt with in a concise and useful manner, and numerous analyses are given; whilst the concluding chapter is on the physiological effects of alcohol, a thorny subject on which physiologists themselves are by no means agreed.

In our opinion, the author has produced a most useful and erudite work, which should prove invaluable to analytical chemists, manufacturers and all who have to deal with that branch of chemistry with which the book is concerned. The diction is clear and to the point, and we have noticed no serious typographical errors.

ARTHUR R. LING.

IRON BACTERIA. By David Ellis, D.Sc., Ph.D., F.R.S.E. Methuen & Co., Ltd. Pp. 179+xix. 10s. 6d.

This volume is of the nature of a monograph, written by an authority whose name is a guarantee of careful work. It gives an account of the known bacteria which possess in common the property of being able to abstract iron from the waters in

which they live, and collect it in the form of ferric hydroxide on their surfaces. These organisms occasionally give rise to serious trouble and inconveniences, as instanced by the Cheltenham visitation of 1896, and by the partial reduction in effective bore of the conduit pipes of the Lake Vyrnwy–Oswestry section of the Liverpool water supply during the period 1898-1900. The volume under review is to be warmly commended, not only to biologists, but also to engineers and chemists actively interested in water storage and supply problems.

The first six chapters are concerned with biological details, such as the distribution, structure, reproduction and identification of the bacteria concerned. Chapter VII. describes the preparation of cultures, Chapter VIII. deals with the physiology of these bacteria, while the remaining three chapters give a succinct account of the economic problems founded on their properties and of the part they play in Nature. Plates are inserted in the book to assist the investigator in the identification of any of the iron bacteria; but a neophyte would be well advised to acquire considerable experience before attempting to carry out this work, particularly as few or no specific staining methods are available.

In a few cases, statements might be somewhat altered with advantage; for example, it is difficult to understand why the unit μ should be explained on page 11 when it occurs on pages 4 and 5, and why it should need a repeated explanation on page 47. *Pleiomorphism* is defined on page 38, but the term occurs misprinted on page 15. The letterpress of Fig. 23 would appear to indicate a form of "*Spirophyllum ferrugineum*" about $1\frac{1}{4}$ *in.* in width. The data given on page 56 for the rate of reproduction of crenothrix polyspora need not be viewed too seriously, as, unless they are misprinted, the figures appear to be based upon an assumption thas $10^4 \times 10^2 = 10^8$, and that $10^8 \times 10^2 = 10^{16}$.

If a further comment might be added, it is that the quotations *in extenso* from the German authorities should be given in English, for without doubt most water engineers are unacquainted with scientific German.

These points detract but little from a volume which is of great interest, and which cannot fail to be of value to those responsible for the supervision of water supplies. The references to the literature of the subject should prove useful to the specialist.

F. M. P.

QUANTITATIVE CHEMICAL ANALYSIS. By Alex. Charles Cumming, O.B.E., D.Sc., F.I.C., and Sydney Alexander Kay, D.Sc. Third Edition. London: Gurney & Jackson, 1919. Pp. 416. 12s. 6d. net.

This book is intended primarily for university and college students. It is a laboratory text-book of great merit, for it is printed clearly and in large type, is not too verbose, is accurate in its descriptions, and has kept abreast with recent developments in analytical practices.

In this new edition of their book the authors have included a description of the diacetyldioxime method for the determination of nickel, a description of a calorimetric method for the determination of titanium in silicates and iron ores, and a description of a form of calorimeter used by the United States Geological Survey.

In the chapter on gas analysis the authors have followed the usual text-book practice of describing the old form of Hempel apparatus, the measuring tube being used without any water-jacket. As the book is written for students who wish to pass examinations, the authors may be wise in their choice; but professional gas analysis now commonly use some other form of apparatus. There are many other forms which are more convenient and are likely to yield more accurate results. In view of the fact that much attention is now being devoted to the proportion of "inert" gases in the public gas supply, we should like to have found in the book a description of the copper oxide combustion method, which is in extensive use for ascertaining the proportion of nitrogen present in coal gas; and a description of the Birmingham method of using the Bone and Wheeler apparatus in conjunction with a copper oxide combustion tube for a complete gas analysis would also enhance the value of the book. The method given for the determination of the amount of sulphur present in coal gas is good; but it is not the method prescribed by the Gas Referees.

A particularly useful feature of the book is the frequent introduction of a word of warning or advice with regard to some common source of trouble in conducting the method of analysis under consideration. These practical notes are of great value.

A fresh addition to the Appendix consists of a list of books of reference with the dates of issue of the latest editions. This list will be useful; but since some of the books are very costly, and students generally have to keep a careful watch upon expenditure, the list would be of yet greater utility if the price of each book were mentioned.

H. F. H.

TRANSACTIONS OF THE CERAMIC SOCIETY. Vol. XVIII. 45s. per volume to non-members.

The volume covers the proceedings for the session 1918-1919, and forms a valuable compendium of the most recent work in connection with the manufacture and uses of refractories, chemical stoneware, and the rarer minerals used in the fireclay industry. The various clays and heat-resisting substances present an immense field for scientific research, and it is largely due to the zeal of the Ceramic Society, and its indefatigable honorary secretary, that manufacturers at the present day have come to appreciate the value of admixing brains with their raw materials. The Society's proceedings, coupled with the abstracts which are now included in each volume, form the most complete and authentic publication on the subject, and should prove of exceptional utility to all engaged in chemical and metallurgical engineering. It is to be noted that the Society is constantly adding to its roll of membership; but there are still many engaged in those industries in which refractories, in particular, are an essential adjunct, who are not yet members, but who would have a good deal to gain by joining.

A. M.

Photographic Pastimes

AT a meeting of the Royal College of Science Chemical Society, on Friday, November 28, a lecture on "Photographic Pastimes" was delivered by Mr. Hickman, B.Sc. Professor J. C. Philip presided. Though consisting primarily of a systematic treatment of the processes of intensification and reduction on lines appealing particularly to the expert photographer, the discussion introduced a point of purely chemical interest with regard to the mechanism of the reactions occurring.

The processes in question involved the subsequent alteration of the opacity of the silver deposited on the negative. The chemical or physical addition of other molecules would thus affect intensification by increasing the bulk of the silver particles; in moderate degree by conversion into sulphide and, in a far greater degree, by converting the image into iodide, staining with methylene blue and reconverting into sulphide. It was curious that different intensifiers affected predominantly deposits of one particular range of density, and it was therefore possible to obtain selective intensification by choosing the method employed. It should be noted that, in contact printing, the increase in size of the silver grains is more than counterbalanced by the scattering of the light by the iodide, and it was therefore necessary to dye the surface of the iodide grains with a compound such as auramine, which totally absorbed chemically active rays.

With regard to reduction, the lecturer made known his discovery of a method of obtaining an equal decrease in all tones, a method depending simply on the very slight solubility of silver chloride. The image is converted into the chloride, and is subjected to prolonged washing, during which a small proportion of the salt is removed in solution from all deposits. This, therefore, forms a valuable addition to the methods already available, since ammonium persulphate and potassium ferricyanide are each more or less localised in action, the former affecting heavy, the latter the weak deposits.

By special request the lecture was supplemented by a demonstration in flashlight photography (in the course of which employment was made of a new rapid fixer discovered by the lecturer), and an illuminating treatment of colour photography, illustrated with a varied selection of slides taken by the Paget process.

"Evaporation"

Lectures by Mr. H. J. Pooley

The first of two lectures on "Evaporation" was delivered by Mr. H. J. Pooley (Messrs. George Scott and Son (London), Ltd.) at the Manchester College of Technology, on Tuesday, November 25.

The subject of evaporation, Mr. Pooley said, was certainly the most important in the modern chemical engineer's curriculum, partly on account of its influence, in many cases, on the quality and yield of product, but always mainly on account of the hitherto undreamt of price of fuel. There was a very good example, in the case of natural salt evaporators, of the combination of the power and evaporation question. He had often been asked to put down an installation of a character in which the circulation pumps were to be driven by electric motor, when it was obvious that the use of fuel was necessary. The correct principle was to drive the pumps by steam and to use the exhaust steam in the evaporator.

The Salt Pan

The salt pan was thermally very efficient as a single effect evaporator. Its disadvantages were the heavy upkeep, the amount of labour, the loss in evaporation per square foot due to the deposit of solids, and the effect of the escaping steam on the surrounding structures. A salt pan would always be used where coarse ground salt was necessary, and where it was impossible to obtain a vacuum evaporator. Mr. Pooley showed an illustration of the "Porion Evaporator," in which the waste heat from the ash burning furnaces in the recovery of the soda ash was used in direct contact with the black liquors, a large area of contact being provided by means of paddles. This type of evaporator was quite efficient in its way, and gave recovery in soda at about 75 per cent. under the very best circumstances; 55 per cent. would be more usual. Part of the loss was due to the reduction of the weak liquors which would not stand the value of the extra fuel necessary, in addition to the heat due to the burning of the ash, and partly to the entrainment that took place in the velocity of the flue gases, which carried the soda away up the chimney. In a modern paper works, with rotary furnace, multiple effect evaporation, waste heat recovery from the back of the rotary furnace, a recovery of 90 per cent. was obtainable based on the original soda used, and, in the best instances, no extra fuel beyond that which was contained in the carbonaceous matter of the black liquors themselves was used. He thought that represented the highest possible limit in conserving heat units. The whole of the soda was recovered, less 10 per cent., at no cost for fuel.

The next illustration showed a simple form of using waste heat at the tail end of the boiler economiser: the top end of the sensible heat units being already taken for other purposes. Such a type would only be selected in the case where fuel was extremely expensive, and it had many disadvantages. The heat was not very high, and there were difficulties of cleaning the tubes owing to the deposition of soot and tar. It should always be remembered in regard to waste-heat problems that the heating value of air or gases was very small. The temperature might be very high, but the specific heat of the air was so low that it carried only a very small proportion of heat with it, and consequently a very large amount of heated surface was necessary to do the same work that could be done in a much smaller pan with steam heat in which the latent heat was the majority of the heat.

Steam Heating

Long before the development of later examples of evaporators steam heating had become more usual. It took a long time to find its way into chemical works, mainly because it was regarded as the source of energy for a steam engine. The Chenaillier type of evaporator was very much used in Marseilles. It had a cylinder, steam heated inside, with purging blades to remove the condensed water. It was made in a series of lines, shaped of members strung together, with a perforated tube in the form of a Wetzel pan, which was a coil wound into cylindrical shape and rotated. This was the first attempt to take advantage of rapid evaporation when the liquor was in a thin film, and as such it was the greatest advance in steam-heated atmospheric evaporators. Its deficiencies, as compared with the modern evaporator, lay in the low heat at which the liquor passed over the surface and the entrainment due to the contamination with the air. He had had several instances where it was necessary to put down a vacuum single-effect evaporator to replace, or work side by side with, this type. There were four or five installations working in Marseilles, and the yield of glycerine, starting from the spent lye, was very nearly 100 per cent. available in the case of the vacuum plant and only 75 per cent. in the other. The difference was almost entirely due to entrainment, because the temperature was not very high. The boiling point of glycerine, in the atmosphere, was about 120°C., and under vacuum about 90°C. Thus, there were possibilities of the destruction of the delicate material, particularly when reaching the finishing point. Owing to the loss from entrainment the surrounding objects in the pan room in the Marseilles works were sticky and salt.

Modern Development in Design

The first vacuum apparatus was invented by the Englishman, Howard, and was brought out in the year 1812, taking the form of a shallow jacketed pan, with the vacuum produced by an ejector. During the past 30 years development had been extremely rapid and difficult to follow. Many designs had been brought out, a great number of them being fantastical. The use of vacuum did not necessarily mean heat economy to any great extent. The advantage in single effect lay solely in the low temperature, which was of importance in dealing with liquors which were easily decomposed by either prolonged heat or high temperature. He mentioned prolonged heat because evaporation from a given hot surface in a vacuum was very much more rapid. It brought into play exhaust steam as the heating medium, which was impossible for liquors having a boiling point anything over 100°C. Briefly, it meant a saving of floor space, a lower temperature, control of the evaporators, improvement of sanitary conditions, improvement to surrounding property by the prevention of the escape of steam, rapid evaporation from a given surface, and, if properly applied, high velocity of liquors, reducing the scale or the deposition of solids.

Obviously, multiple effect enabled one to obtain a large temperature drop from the temperature of the heating medium to the temperature of the final effect, and the large drop permitted the use of a greater number of effects, or multiplications, than would otherwise be possible. There had to be a minimum drop between the heating minimum and the heated material, according to the design of evaporator.

The Coil and Jacket Pan

It was rather a curious paradox that in several of the industries where a rapid circulation and a rapid evaporation would be of most advantage, the coil and jacket pan still appeared to hold its own. Possibly the best example in this direction was in milk condensing, but the pharmaceutical trade was also a sinner in that respect. It appeared to be a survival from the days when the coppersmith was the sole chemical engineer. A well-known condensed milk company used entirely coil and jacket pans for the production of enormous quantities of milk. They realised the advantages of the tubular pan, but were afraid to make a change in case it produced a slightly different flavour in their product, thus necessitating the scrapping of the whole of their existing plant. The tubular pan was now being used to a large extent in milk condensing, but not by the old-established firms.

The deficiency with the jacket pan was that it was necessary to fill in a large body of liquor, the bulk of which had to be evaporated this involving a large heating surface as the desired reduction point was being reached a certain proportion of the hot surface must necessarily be uncovered, splashes of the liquor naturally depositing, thus being in a position to be completely dried out. The moment they were dried out the restricting influence of the boiling point of the water on the temperature was removed, and the dry product could take up the full temperature of the heating medium. When it did this, it generally scaled off and dropped back into the product, and there was contamination. This was the effect when dealing with small quantities.

The Points of a Good Evaporator

Mr. Pooley summed up the points of a good evaporator under eight heads. First, there was the suitability of the material of which it was constructed and the non-contamination of the liquors. It was quite a fallacy, and unfair commercially, to claim that one evaporator had a more rapid passage of steam—

—*i.e.*, the heating fluid—over the heating surface than another. In the matter of a second factor, the passage of the heated liquor over the heating surface, there was scope for a very wide difference between one design and another. It was considered that the rate of evaporation over a given area varied as the square root of the velocity. This point of circulation, as it was generally termed for convenience, was the outstanding feature in regard to output, deposit of solids, crystals, &c., to a certain extent, and in certain designs, in the matter of entrainment, priming or frothing. The third important point was a free escape of the produced vapour. The fourth was the clear drainage of the condensed water or liquor. The effect of water-logging of the tubular space was obvious, and was often due to carelessness. Some designs lent themselves to water-logging more freely than others, and there was corrosion of the tubes at the surface of the water film, particularly when the evaporator was laid off every night. Corrosion took place at the junction of the water and the air space, because, of course, the air followed in and took the place of the steam when the plant was shut down. It was not possible completely to drain any tube plate, because the capillary attraction, or the surface tension, of the water necessitated a part of the water lodging in the angle between the tube plate or the vertical walls of the tube. This was always the case unless some means were taken completely to dry out the chamber.

The next point of importance was the freedom from entrainment and the consequent prevention of loss of product. Another matter was the question of ample vapour pipes. This had a very great bearing upon the entrainment question and velocity. Frictional losses must be avoided in the vapour pipes. Other points were accessibility and compactness.

Without taking the various heads in detail, Mr. Pooley showed on the screen illustrations of leading types of evaporators for the purpose of indicating with greater clearness the points he had mentioned, and explained the construction and methods of working of the Lillie, Newall, Swenson, Yan-yan, Foster, Kestner, Mirlees, Edwards and Scott evaporators, and the various methods adopted for avoiding entrainment.

The Second Lecture

THE second lecture on "Evaporation," by H. J. Pooley (George Scott & Son (London), Ltd.), was given on Tuesday last at the Manchester College of Technology, and dealt mainly with the problems attendant upon the operation of multiple evaporators.

An illustration of a triple effect evaporator of an interesting form was shown, being designed to eliminate ground space as far as possible and to reduce the amount of metal used in its construction, and which was particularly useful in the case of liquors necessitating the use of expensive metals. Its principal defect was the inaccessibility of the tubes, there being not sufficient space to get at the bottom ones. A Scott type triple effect evaporator was also explained. In the case of the sextuple effect evaporator shown on the screen, Mr. Pooley stated that it possessed no particular feature beyond the number of effects, which were limited, however, to the temperature drop.

Dealing with the question of heaters, Mr. Pooley explained that while in some respects there were losses, yet in others there were gains. Generally a liquor, as it concentrated, had a lower specific heat, and to that extent there was also a gain because the amount of heat in the feed was reduced. Radiation losses were quite small in a well-lagged plant. Inter-heating might be partially arrived at without the use of external heaters by passing the feed in the reverse direction. In contrary feeding a pump must be placed between each of the effects. The liquor flowed against the pressure, and consequently it was necessary to have a machine between the effects, all of which had to be attended to and should in a plant of importance be in duplicate. This destroyed the attraction of contrary feeding. An application of inter-heating in the form of a sextuple effect plant for the production of distilled water from sea water was shown.

Mr. Pooley explained by means of a diagram the difference between multiple effects up to eight, with and without inter-heaters. It was not worth while adopting a quadruple effect unless inter-heaters were used. Salt evaporators could, perhaps, be described in three ways: (1) The type in which crystals were deposited in the evaporator and removed during evaporation, (2) deposited in an auxiliary chamber heated externally, and (3) evaporated to saturation or super-saturation point and discharged for crystallisation. It was not necessary to deal with the third type. The most common type was that in which the crystals were removed from the evaporator during working.

In dealing with salting liquors, in almost every case, it was practically impossible to use high-pressure steam owing to the salt depositing on the heating surface. The evaporator must be provided with a shape at the bottom which would throw the salt down into whatever form of device was used to remove it from the evaporator without disturbing the evaporation work, and in general that meant not allowing the air to enter the evaporator through the device. In the second type of salt evaporator the liquor was heated to a temperature in excess of the boiling-point of the liquor in the vacuum vessel into which it was intended to discharge it. It was heated externally and any salts which were more soluble in hot liquor than in cold were not allowed to deposit in the tube. The moment the liquor reached the vacuum vessel the temperature was instantaneously reduced, the crystals depositing partly on account of the lower temperature and partly on account of the evaporation.

Mr. Pooley mentioned an interesting experiment recently made by his firm with respect to the crystallisation, in the evaporator, of calcium acetate. The calcium acetate showed a greater solubility at low temperatures than high throughout the entire scale, except between the points 60°C. and 82°C. Therefore, at this point, they decided to pass the liquor through an external heater so that it should not crystallise in the tubular apparatus. From the heater it was passed into one of the effects, actually the first. This effect had no tubes in, and the evaporation took place owing to the automatic reduction of temperature resulting from the lower pressure. The original liquor was fed into the second effect, and from there into the third effect, from which it was passed through a filter and so to the tubular heater mentioned. A continuous circulation was maintained by a separate pump through the heater into the first effect and back through the heater, &c. Mr. Pooley went on to explain the operation of thermo-compressors, finishers and continuous stills.

He regretted that he had had to considerably curtail the points of his lectures, the time at his disposal not being nearly sufficient to enable him to do full justice to the subject-matter of "Evaporation." The problem was really one of the most abstruse that manufacturers had to consider.

Dr. Herty's Mission to Europe

DR. CHARLES H HERTY, editor of *The Journal of Industrial and Engineering Chemistry*, who was commissioned by President Wilson to negotiate with the Inter-Allied Reparation Commission regarding supplies of vat dyes for American consumers, has completed arrangements and is on his way back to New York, if he has not already arrived. Under the terms of the treaty of peace 50 per cent. of the German supplies of dyes were to be turned over to be distributed among the allied nations through the Rhineland Commission. For some time no action was taken along this line because of the absence of an American representative on the Commission, due to the refusal of the Senate to permit President Wilson to appoint such a representative until after ratification of the peace treaty. Dr. Herty finally was sent abroad to act in this capacity by the War Trade Board. When the German list of dyes on hand were submitted, and these were distributed among the allied nations, it was found that approximately only 30 per cent. of the dyes wanted by American consumers could be obtained in this manner. Dr. Herty then negotiated and obtained from the German Chemical Cartel options on sufficient dyes to meet the full requirements of American consumers for a six months' period, as shown in applications to the War Trade Board and the licences granted to consumers. These, it is said, will be handled in the same manner as those which were obtained through the Rhineland Commission, being handled through the Textile Alliance. Details of the result of Dr. Herty's mission are not yet known, but are expected to be available shortly.

The Chemical Engineer

AT the last meeting of the Bristol and South Wales Section of the Society of Chemical Industry, the subject of sulphur burners was introduced by Mr. Hawkes, who mentioned the difficulties of burning sulphur and the peculiarities of different forms of sulphur which up to the present were unaccounted for. A description of various types of sulphur burners followed. A further contribution to the subject was given by Professor Hinchley and Mr. Humphries, who, with Mr. Talbot, had come down as representatives of the Chemical Engineering Group of the Society. Professor Hinchley stated that we in this country were still behind the Continent in chemical engineering. During the war we had to rely on American help, and although we had improved we did not produce with success many forms of apparatus that seemed to be made with ease on the Continent. What was required was a man who, while not a first-class engineer, combined sufficient knowledge of both subjects to interpret one branch of science to the other. In the past the engineer and chemist had been unintelligible to each other. The chemical engineer would not replace either chemist or engineer, but he would provide "the missing link" between the two. Mr. Talbot outlined the programme and policy of the Chemical Engineering Group, who had held, and were holding, conferences on generally interesting subjects, such as transport of liquids, heat exchangers, and were engaged in the compilation of tables of useful data hitherto uncollected. Dr. Francis spoke as to the requisite training for a chemical engineer which would apparently have to be over an unusually extended period if adequate.

Rhineland Chemical Works

Mr. D. A. Bost's Address to the Glasgow Section.

MR. D. A. BOST was the speaker at the first meeting of the new session of the Glasgow Section of the Society of Chemical Industry, held on Friday, November 28, in the North British Station Hotel, Glasgow, under the chairmanship of the President, Mr. Quinten Moore, and the subject for discussion was "A Visit to the Rhineland Chemical Works." There was a large and appreciative audience. In introducing Mr. Bost, the Chairman said that he had a unique distinction of being the only Scottish member of the chemical industry privileged to be present when the British chemical manufacturers had the opportunity of going to the German chemical works.

Mr. Bost said that the main object of the mission was to establish if possible the basic principle upon which the German chemical industry was founded and to place before the British chemical industry a description of the plant and processes which would be compared by those interested with British plant and processes. It was to be expected that the Germans were not going to give away anything if they could help it, so that the members of the mission had naturally to be chary of accepting all they were told as gospel; but by keeping their eyes about them, they were able to obtain much useful information. Another thing which was against them was that they were not allowed to take notes, and it was rather difficult to go through all sorts of plant and processes for two or three hours and then write up afterwards all they had seen.

Impressions of German Works

Mr. Bost gave an interesting description of the journey to Germany up to the arrival at the Bayers Works at Leverkusen, and pointed out that this whole village belonged to Bayers (or nearly the whole of it) and that it was laid out as a garden city. The directors received them in the main offices, and the visitors were taken round the show places; and, while they did not really see any manufacturing process in detail, as these were mostly carried out in closed vessels, they saw finished products being put in capsules, tubes, bottles, &c. They had expected to see a great deal of ferro-concrete work on the buildings, but they found that most of the buildings in which the products were manufactured were brick, built with tiled or slated roofs. They were about 40 ft. high, and plant up to that height could be erected inside in any suitable place; storage tanks being supported from the floor in platforms placed where wanted, as there were no regular floors. The roof lights afforded a great deal of light, but that from the side windows did not generally reach the middle, as the plant obstructed it. They also found a chemical library in the works with all (or at any rate most) of the books published in chemistry since 1535 A.D.; and they found that this firm was most assiduous in its endeavour to secure all books dealing with chemistry as soon as published. Indeed, they were interested to learn that one particular book of very great value (though not generally known), which was published in Great Britain in May, 1917, found its way to this library in June, 1917. As he had indicated, one thing which struck them very forcibly was the almost complete absence of the use of ferro-concrete in the construction of buildings devoted to the manufacture of chemicals, and the reason was that the Germans recognised the probability of changes in plant and processes and that such permanent construction might interfere with these changes. Ferro-concrete was, therefore, only used where great strength was required or in the power houses.

In Germany, Mr. Bost said, men talked about chemistry just as they on the Clyde talked about boats or engineering, and as most engineers on the Clyde were also business men, so too were the German chemists business men. Undoubtedly many of their British chemists were also business men, but not to the same extent as in Germany; in fact, no better parallel could be given than the position and qualification of an engineer in this country. The foundation for a very technical chemical industry being thus laid it was only necessary for the Germans to find cheap raw materials—and the Rhine basin lent itself to this. The Rhine was a swift flowing river with a big lime content, so that any effluent from the chemical works was quickly carried away and any acid in it was neutralised. It was navigable for many miles and the chief centres of chemical manufacture were scattered over a length of 200 miles from Ludwighafen to Duisberg; while numerous small rivers and canals ran into it from the surrounding valleys, and Nature having provided these, man had supplemented them with railways. The Rhine was connected by the waterways mentioned above with districts producing salt, lime, coal, coke, tar, pyrites, and it cost little to barge them down. Once these raw materials had been made into finished products they could be sent cheaply abroad by means of the Rhine or inland by the railways referred to where rates were very low, even if (or because) transit was slow.

While the above circumstances were favourable to the foundation and development of the chemical industry, another factor was necessary if an electric or electrochemical industry was to be formed; and again in the Rhine Valley was found cheap matter for developing power, namely, brown coal or lignite, a sort of peat. This lignite was found in beds of immense depth, and it was only necessary to remove the soil above it and take it out with grabs or steam navvies. Before the war current was supplied to works within 30 miles of the generating station (built upon these fields) at less than one-tenth of a penny per kilowatt-hour, and this, therefore, compared very favourably with the price of that produced by water-power; while in addition to all the foregoing facts and factors they had workmen in Germany accustomed to be ordered and to obey to the letter.

Points of the German System

The advantages of the German system were (*a*) cheap raw materials, cheap power and cheap carriage; (*b*) disciplined men to carry out any process entrusted to them; (*c*) chemists devising these processes and turning out goods of the highest class at the lowest price; and (*d*) engineers to aid these chemists in designing plant of the proper materials to withstand the action of deleterious chemicals. Even with all the above advantages the industry would not have advanced as it had done but for the capitalists who were willing to spend money because they had faith in the ultimate result, and who tackled problems courageously even when it was evident it would take years to find a solution. He might, for instance, mention the question of artificial rubber which, when the desired analysis was reached, initially gave a product in no way resembling rubber until after nine months digesting at a temperature which had to be found out. The fact that up till recently the services of chemists could be obtained in Germany at practically a labourer's wage was undoubtedly a factor in the large number of chemists employed, but all the same the German employers had recognised the necessity for employing chemists to a far greater extent than they had done in this country. Germany had also found her products protected by the fiscal laws of that country and had conducted the business war against all opposition in as ruthless and underhand a manner as she had done in the field.

Again, the Germans had a very much greater security of return for their money than we had in this country, and the owners of their chemical works were not only business men but finished chemists who knew the industry thoroughly. It did not matter how unbrilliant the beginning of any effort might be, even although a process was going to take many years to complete, for they knew that it would ultimately happen, and they spent their money freely until the desired result was attained. In Germany the chemist was looked up to just as an engineer was looked up to in this country, and he was encouraged and inspired in all his work.

In conclusion Mr. Bost mentioned that the mission while in Germany visited 39 works altogether.

Seizure of Pyrogallic Acid

ON Thursday, November 27, in the King's Bench Division, Mr. Justice Sankey resumed the hearing of the test case concerning the construction to be put on a prohibition of imports order in Council, brought by the Crown against John Brown, trading as Brown and Forth, chemical manufacturers, of Manchester and London, for condemnation of six packages of pryogallic acid. The Crown claimed that the pyrogallic should be forfeited as it had been imported into this country contrary to the Prohibition of Imports, No. 32 Proclamation, of June 25, 1919. The proclamation was made by Order in Council under the provisions of Section 43 of the Customs Consolidation Act of 1876, which provided that the importation of arms, ammunition, gunpowder or any other goods might be prohibited from importation by proclamation.

After Mr. R. A. Wright (for the defendant) had further addressed the Court, and as reply had been made on behalf of the Crown, his Lordship reserved judgment.

Society of Chemical Industry

Papers Before the London Section

AT the meeting of the London Section of the Society of Chemical Industry, which was held in the rooms of the Chemical Society, Burlington House, Piccadilly, on Monday (Mr. Julian Baker, the chairman, presiding) two Papers were read.

"Ethyl Chloride"

The first, on "Ethyl Chloride," by Mr. Albert Henning, was written as an answer to what the author regards as the erroneous impressions held by many chemists and others in this country as to the characteristics of ethyl chloride for a number of uses apart from medicinal purposes. Mr. Henning stated that ethyl chloride is too often regarded as a troublesome material to handle, and that its only advantage is cheapness. That, however, was far from being the case. It was now being manufactured in large quantities in Germany, France, Switzerland and Canada, and quite recently a factory had been started in Australia. On the question of cheapness it had the advantage over other ethylating agents to the extent of about 60 per cent. That it was not difficult to handle was shown by the fact that it was supplied in syphons and could be poured out of a jug.

Describing its value as a refrigerant, the author said that in America the Board of Fire Underwriters had approved it and it was being used in the United States Navy. The principle uses of ethyl chloride were stated as follows: (1) in the systhesis of dye stuffs and drugs as an ethylating agent; (2) as a working substance in refrigerating machinery; (3) as a solvent for extraction purposes; (4) in research work and laboratory practice.

A large number of slides were shown illustrating types of apparatus now in use, and emphasis was laid on the point that ethyl chloride does not become acid on storage if properly stabilised during manufacture. There was, Mr. Henning said, too little recognition of the importance of ethyl chloride and too much tendency to refer to the more expensive methyl derivatives, an enormous quantity of which were made in Germany before the war, although he doubted if these methyl derivatives were always methyl, although so labelled. It was highly probable that they were sometimes ethyl.

Ethyl Chloride as a Refrigerant

The Paper gave, he said, for the first time, a complete set of figures with regard to the use of ethyl chloride in the design of refrigerating machinery, relating to the thermal properties, vapour pressure, latent heat, specific volumes, &c. Instead of an elaborate compressor plant a simple rotary pump could be used. For a simple ethyl chloride machine with cooling water at 65°F., an 18 in. diameter rotary pump running at 150 to 300 revs. per min. could be used. In this country ethyl chloride was practically unknown as a refrigerant, but in America it had been known and used for several years, and 150 plants were running there. The Canadian Government had 20 plants and the French Government had six or seven warships fitted. The oldest ethyl chloride machine for refrigeration purposes had been in use for nine years at the Hanover Bank, New York, and it had been removed in order that a larger one might be fitted. A very promising development in this connection was the provision of small plants for household use having a capacity of 500 kg.-calories per hour, which could be driven by a ¼ H.P. electric motor. Ammonia or CO_2 plants would be positively dangerous in private houses owing to the high pressure necessary, whereas with ethyl chloride the highest pressure was 15 lb. per square inch.

Discussion

Mr. HENNING, replying to the discussion, said that with regard to the comparative cost of the ethyl chloride refrigeration process and the ammonia process, he would ask Mr. Bishop, who had gone into this question very largely, to deal with that matter. There were not sufficient ethyl chloride machines at work to give a very precise comparison. There were probably 200 or 300 machines, but they did not enable an exhaustive statement to be made as to comparative cost because the comparative data was not available.

Mr. BISHOP said he had built a number of ethyl chloride plants and from his experience he should say that they were from 5 to 7½ per cent. more expensive in capital cost than the carbonic anhydrite system. These plants, however, had only been built in small sizes, and they probably, owing to their range of size, cost more than either ammonia, carbonic acid or SO_2 systems, but there were the advantages of simplicity, speed and automatic operation. The cost of running was practically the same.

The Influence of Impurities in Lead

A paper on this subject, read by Mr. Charles E. Barrs, contained the results of experiments which the author hoped would be of use to sulphuric acid manufacturers and other users of lead for chemical purposes. Two grades of lead were analysed and they proved to be very different in their resistance to the solvent action of sulphuric acid. The tests showed that those samples of lead in which copper predominated as the impurity were most resistant when heated with sulphuric acid. Experiments were also carried out to see at what temperature sulphuric acid attacked various other metals, and several tables of figures were given in the complete Paper. The general result shown by the experiments was that the purer the lead the less liable it is to attack. It had, however, been found desirable to add a small percentage of copper 0·2 to 0·5 in order to ensure obtaining the maximum resistance.

Discussion

Mr. H. M. RIDGE asked whether the author could give any reason for the fact that according to his tables, lead containing a larger amount of bismuth generally suffered attack at higher temperatures than a lead which was comparatively free from bismuth. The same applied to the lead containing a considerable amount of silver. He had always looked on bismuth and silver as two elements which played an important part in the chemical attack of lead and in obtaining his supplies he had always laid a certain amount of stress on reasonable freedom from bismuth and silver. He further asked whether Mr. Barr had done any work in connection with the varying atomic weights of lead and whether he had found that that had any bearing on the question of chemical attack by sulphuric acid.

Mr. ROWELL said it was usual to employ Pattersonised lead for best work in sulphuric acid plants and the difference between that and the lead of which figures were given by the author was probably due to zinc contents. A small percentage of zinc would cause a much more rapid action of sulphuric acid on lead than any other metal.

Mr. BARR, replying, said the analysis which he had given in the Paper did not represent the whole of the work that had been done. Much work had been done in which the analyses, with the exception of the copper, were very similar, but always with the same difference in the resisting power to the acid. He had not done anything in connection with the atomic weights of lead.

Mr. LANCASTER said that if more than 0·2 per cent. of copper was introduced into the lead it gave rise to commercial difficulties. He could not agree with Mr. Ridge's remarks with regard to the effect of silver; he thought that a small quantity of silver protected the lead.

At the conclusion of the meeting, a petition was presented for the signature of the members in favour of the Patent Office Library being again kept open until 10 p.m. The petition is to be handed to the President of the Board of Trade.

Plytol Chemical Company, Ltd

A PETITION by the Plytol Chemical Company, Ltd., for the confirmation by the Court of a special resolution altering its memorandum of association with respect to its objects, came before Mr. Justice Astbury in the Chancery Division on Friday, November 28. Incorporated in 1917 with a capital of £10,000, the company was formed to carry on the business of vendors and dealers in chemicals and oils, and other substances. The alteration proposed was to "carry on business as manufacturers of disinfectants, sheep dips, chemicals, dyes, oils, petroleum, tar, creosote, pitch and any other kindred substance or manufacture, and to refine, prepare for market, trade or otherwise dispose of, and to buy, sell and deal in the same in any way whether wholesale or retail."

Counsel said the company had no debenture debt and it had ample working capital, and its assets were more than sufficient to pay all its debts.

His Lordship confirmed the resolution.

THE BIRMINGHAM Tame and Rea District Drainage Board have completed negotiations for the sale of 40 acres of land at Bromford, near that city, to the Valor Co., Ltd., of Aston. Facilities will be given for the construction of a railway siding to be connected to the Midland Railway main line. Ald. Sayer, the chairman of the Board, said he understood that the Valor Co. was a branch of the Anglo-American Oil Co.—one of the largest oil producers in the world—and it was the intention to build a large factory as well as many employee's cottages.

Lubrication

Discussion at the Physical Society

THE subject of "Lubrication" was discussed at a meeting of the Physical Society of London held at the Imperial College of Science, South Kensington, on November 28, Mr. C. H. Lees, President, in the Chair.

Dr. T. E. Stanton, F.R.S., who opened the discussion, referred to the work which had been done on the physical and engineering side of the problem of lubrication during the last 40 years.

Mr. Barnes (speaking for Mr. R. Mountford Deeley) said that any viscous liquid might act as a lubricant if such conditions were adopted as would ensure a proper film being formed. The formation of a proper lubricating pad or film could not always be relied upon. At very low speeds and under very heavy loads such a film would not form, and in other cases the lubricant was only held in position by capillary forces, and a film of sufficient thickness did not form. Efficient lubrication, therefore, depended upon the liquid possessing some other property which enabled it to reduce the frictional resistance sufficiently. It thus came about that a true lubricating oil was regarded as a liquid possessing oiliness. So far, no satisfactory explanation had apparently been given as to what oiliness really was, and all that could be said was that some liquids of similar viscosity were not oily in this sense and would not act as lubricants. Vegetable and animal lubricants were compounds of carbon, hydrogen and oxygen termed esters, formed by the union of alcohol radicles with fatty acid radicles. There were a great number of such fatty esters, several of which generally went to form each lubricant. The alcohol radicle occurring in the vegetable oils and in most of the animal oils was the trivalent radicle glyceryl C_3H_5, and its esters, known as glycerides, might be represented by the formula $C_3H_5R_3$, in which R represented the fatty acid radicle. Thus we had triglyceryl stearate, $C_3H_5(O.C_{18}H_{35}O)_3$; triglyceryl palmitate, $C_3H_5(O.C_{16}H_{71}O)_3$; triglyceryl oleate, $C_3H_5(O.C_{18}H_{33}O)_3$; and many others. Stearin and palmitin predominated in the solid fats, olein in the fluid oils. Olein was the chief constituent of many of the best known lubricants, such as lard, tallow, neatsfoot and olive oils. Allied to the fats were the waxes, which were esters of mono- and di-valent alcohols, and a few lubricants such as sperm oil belonged to this group. Mineral lubricating oils were of entirely different chemical composition, consisting essentially of hydrocarbons, compounds of carbons and hydrogen, and we know little concerning their ultimate chemical structure.

PRINCIPAL SKINNER'S VIEWS

Principal Skinner said that the two main divisions of lubrication were (1) full lubrication with an abundant supply of the lubricant, such as in an oil bath; and (2) with a limited supply, as is obtained with an oil pad with a little oil on it. The results of some experiments made by one of his students with glycerine in a Lahmeyer oil tester bore out the view that viscosity was the important physical property in a fully lubricated machine. In connection with the second division, recent experiments made by Mr. W. B. Hardy and his son might go far towards the action of very thin films of oil. It appeared that the clean glass surface of a watch-glass always seized on a clean glass plate, however little the normal pressure between them. The watch-glass could not be displaced without tearing itself and the plate. When very thin films of liquids were used it was found that some liquids were inactive whilst others promoted slipping and were lubricants. This division of liquids into active and inactive was an important discovery. The inactive liquids included water, alcohol, ether, whilst the active liquids included oils. With thick films all might be lubricants. As a result it appeared that oils in very thin layers could prevent seizing. It was only necessary, perhaps, it might be said, to have the thinnest layer of active liquid to enable smooth metal surfaces to pass over one another freely. For lubrication with limited supply of lubricant we should, therefore, require a fluid that must readily form a film on the surface. The theory briefly was that certain thin films would prevent the molecules constituting the surfaces from coming within their distance of cohesion, or from exerting cohesive attraction.

Mr. W. B. Hardy, referring to his experiments, said that he had tried to avoid mechanical complications and had used pure chemical substances. The law of mixtures was a complex one, and long and tedious work would have to be in this direction. It would be wise to clear up the question of chemical substances before we went very far.

Molecular Layers in Lubrication

A contribution by Mr. H. S. Allen referred to a previous discussion, in which emphasis was laid on the fact that under certain conditions vegetable and animal oils might be better lubricants than mineral oils. The best lubricants among the latter were those with a large proportion of unsaturated hydrocarbons. The property of oiliness was said to come in when there were regions of metallic contact, and in this connection the important work of Irving Langmuir on surface films might be of interest. Absorption of liquids or gases at the surface of a solid body was considered to be the result of unsaturated chemical forces at the surface. In many cases the absorbed layer was only one molecule thick, and the conditions were determined by the shapes of the molecules and the relative activities of different portions of the molecules. The fact that animal and vegetable oils spread upon water whilst mineral oils did not, was explained by Langmuir as due to the presence of an "active group" in the molecule in the former case, and its absence in the latter. The soluble glycerine ester end of the rod-like molecule tended to dissolve in the water, but the insoluble hydrocarbon end refused to do so, with the result that the molecule stood on end and the surface was covered with a layer of closely packed molecules of the animal or vegetable oil. On the other hand the mineral oils, with hydrocarbon groups at each end, refused to spread. Similarly, in the case of the absorption of a liquid by a solid surface, when the molecules contained active groups, they would become oriented and would pack into the surface layer in much the same manner as in the case of oil films spread upon the surface of water. If the view here suggested were correct the property of "oiliness" depended neither on the viscosity nor on the compressibility of the liquid in the first instance, but on the chemical forces called into play between the active part of the oil molecule and the solid surfaces of the bearing.

Business in Hostile Territory

IN the Court of Appeal on Friday, November 21, before Lord Justice Bankes, Lord Justice Scrutton and the President of the Probate, Divorce and Admiralty Division, the Central Indian Mining Co., Ltd, appealed from a judgment of Mr. Justice Rowlatt. The appeal raised the question whether the defendants, Société Coloniale Anversoise, a Belgian company in Antwerp, were carrying on business in enemy territory within the meaning of the proclamations against trading with the enemy.

In January, 1914, the plaintiffs, who were a company registered in India, agreed to supply the defendants with quantities of manganese ore, the deliveries to be spread over several years. By a Royal Proclamation of February 16, 1915, it was declared that Proclamations relating to trading with the enemy should apply to territory occupied by the enemy as well as to enemy territory. The plaintiffs alleged that at all material times Antwerp was enemy territory within the meaning of the Proclamations, and they claimed a declaration that from February 16, 1915, the contract had been abrogated and that they were relieved from all obligations under it.

By their defence, the defendants admitted the occupation of Antwerp by the Germans, but they said that before the Germans arrived Mr. Van der Taelen, the defendants' managing director, fled to England, taking with him the whole of the defendants' goods, to the value of £300,000. Mr. van der Taelen brought the defendants' books with him and set up business in London, and, the defendants said, the plaintiffs were aware of the fact and from time to time were in communication with him, and both parties treated the contract as existing. Alternatively, the defendants said that the plaintiffs and they had agreed that the contract should not be treated as cancelled, but that deliveries should be suspended during the war. The defendants counterclaimed for a declaration that the contract was still valid and subsisting.

Mr. Justice Rowlatt held that, in the circumstances, the defendants did carry on business in Antwerp within the meaning of the Proclamation of September 14, 1915, and that as Antwerp was hostile territory within the Proclamation, the contract was voided and he gave judgment for the plaintiffs.

Lord Justice Scrutton delivered a considered judgment, in which he dissented from the majority of the Court, holding that the appellants were not carrying on business in hostile territory.

The President of the Probate, Divorce and Admiralty Division, in a judgment read by Lord Justice Bankes, agreed that the appeal should be dismissed.

The Court, therefore, by a majority, dismissed the appeal.

The English Dye Industry

Address by Lord Moulton

LORD MOULTON, speaking at an open meeting of colour users, held in connection with the Colour Users' Association, last week, in Manchester, spoke of the precautions taken to prevent any resumption of the dominating position held by Germany before the war in the production of dyes, and the insertion of provisions in the peace treaty for taking part of her existing stocks of future output for the use of the Allies.

Mr. H. ALLEN, chairman of the Association, who presided, spoke of the work done by Lord Moulton in organising the dyeing industry during the war, and in having secured the insertion in the peace treaty of the clause whereby the Allies have the right to 50 per cent. of the dye stocks in Germany as ascertained on August 15, 1919, and to 25 per cent. of the stocks of all colours produced in the next five years in the whole of Germany.

England's Response to a Colossal Demand

Lord Moulton recalled that when he addressed the colour users in Manchester in December, 1914, he urged the formation of a great dye industry, which must be a national one in order that it should be able to stand up against the powerful dye industries of Germany. It should be an industry too big to smash and too national to bribe. The danger against which he warned them had proved to be a danger so great that the very existence of our country turned upon avoiding it. During the war he was astonished that England, so utterly unprepared with ready-made chemical industries, could respond to the colossal demands upon it, and could at once overtop the great chemical industries of Germany in a war that turned upon chemistry most of all. He had learned that, again and again, the Germans were on the verge of failure to meet the demand for ammunition, again and again were driven from one expedient to another, and, again and again, their chemical industries came to the assistance of the nation with devices which reflected the greatest credit on their scientific power and originality. The factories which we had to build to supply the demands of the war were now disappearing, because they were set up purely for war purposes, whereas the Germans, in their enlarged chemical factories, in the swollen establishments of all their dye firms, had a wealth remaining behind which, although created for war, was still serviceable in peace. The great German dye industry, supported by the Government very largely during the war, accumulated large stocks. England had been starved of them, except in so far as her own efforts had been able to create industries to make dyes under the difficult conditions of war time. Therefore, the first reason for the clause of the peace treaty, which gave the Allies the right to part of the German stocks of dyes, was to ensure that the world would not be at the mercy of Germany, because Germany possessed the only stocks of dye. For that purpose it was provided that 50 per cent. of those stocks should be taken, by way of reparation, at a price to be settled by the Allies and to be credited to the reparation fund. The other part of the clause was intended to protect us in the future.

Counter-Stroke to German Monopoly

Forty years of growth, assistance from the German Government, and our own negligence and that of other nations in regard to chemical industries, had, Lord Moulton said, left Germany in a position to produce special dyes to an extent far greater than any other nation could cope with. Consequently, we provided that Germany should no longer be able to "corner" the dye industry by ensuring that for five years 25 per cent. of her total production should be capable of being bought at the option of the Allies at a price which should be reasonable, at all events as low as the price at which they sold to any other nation. He had been delighted to read, in a German industrial publication, an article protesting that it would make impossible the favourite German "full line system" of selling under which their manufacturers refused to sell a particular dye unless the customer bought all his other dyes from them. It was exactly for that purpose that the clause was inserted, to prevent a German monopoly of dye production. The operation of this provision was limited to five years because its purpose was to stir up England to help herself. To extend the provision over a long series of years would lead us to put off the time when we should apply ourselves to the formation of this industry. If the industry could not within five years become strong enough to bear its burden, and to hold its own against the chemistry of Germany, it did not deserve assistance. The time had already come for the 50 per cent. provision of the treaty to be carried out. Remarking that he had been invited by the Board of Trade to be the English representative at Paris on the committee which was dealing with the 50 per cent., and its division among the Allies, Lord Moulton said that the committee had agreed, without prejudice to the ultimate proportion of the shares, that certain advances should be made out of these stocks. Italy, France and Belgium together were allotted 2,200 tons, we had the right to take 1,500 tons and America also 1,500 tons. The first consignment of our 1,500 tons, he believed, was now on the eve of arriving in this country. It started from Germany several days ago. He did not think there was any foundation for the idea that other nations were getting their shares more quickly than ourselves.

The Amalgamation and Trade Prospects

Alluding to the position created by the amalgamation of British Dyes (Limited) with Messrs. Levinstein (Limited), Lord Moulton said he found himself at the head of this great concern, which had a great honour bestowed upon it by the Government consenting to become a a co-partner, instead of a creditor. Since then it had received a proof of the country's confidence in a subscription of five millions. They had, in his opinion, such a staff that there was no dye of any importance which they were not prepared to make when they had the plant. The idea that there were secrets unknown to them, ignorance of which paralysed their efforts, was absurd. It was naturally true that the experience of the Germans had given them skill in getting the last bit of yield out of a combination. It must be remembered that the German combine was one not only of dyeworks, but of chemical works of all kinds, pooling their profits, and capable, therefore, of selling any particular class of things at a loss if necessary, in order to destroy a formidable growing industry in a foreign country. Such a combine as that, possessing the sort of morality revealed in the reports published by the American Government, was sure to give the British company trouble, and, if they intended to give trouble, it could be done through the most honest and well-meaning people. He said he was not surprised at the attacks made in some quarters upon the company. He never expected that England would take up the job of fighting the huge combine that existed in Germany without the persons who were doing it catching it. One attack which made him very indignant was a suggestion of watered capital, and that there was an inflation of values and the ordinary abuse of the Stock Exchange with regard to it. It was utterly unjustifiable and absolutely untrue to suggest that there was anything like watered capital in the company.

Dealing with complaints by users that they could not get the quantities they received before the war, he said it was impossible for a company so young at once to give a full range in such quantities as might be demanded. Increase in range was not the solution, because they could give a very large range indeed in quantities insufficient for the industry. They had to aim at satisfying in quantity as well as in the nature of the demand, and they were doing that as fast as they could. They produced more indigo now than England could consume, whereas, at one time, users were standing in queues for indigo. It seemed to him that no one was held up so that his works could not do their full amount. He was only held up in the sense that he would rather be making other things than those he happened to be making. "When I spoke to you last," said Lord Moulton, in concluding, "England produced only one-tenth of the dyes you wanted, and I am informed that, by the end of this year, we shall be able to turn out within one-fifth of the amount that England used before the war. The tables are turned. The margin that you want imported is a small part; that which we make is the bigger. That is not a bad account of work done under the paralysing influence of war, and the almost equally paralysing influences of the last few months."

American Report on British Chemical Trade

CONSIDERABLE attention is devoted to the British chemical industry in a report just issued by the U.S. War Trade Board through the Department of Commerce upon the economic position of the United Kingdom.

"The effect of the war upon British trade and production," it is stated, "has been tremendous, but hardly revolutionary. The British formerly depended upon Germany for 90 per cent. of their synthetic dyestuffs and about 70 per cent. of the total importations of potash compounds. The failure of these importations with the outbreak of war left a very large number of British industries in an embarrassed, if not precarious position. The most important process developed during the war was the manufacture of potash from blast-furnace dust. This process has been advanced beyond the experimental stage, and late in 1918 it was estimated that 50,000 tons of potassium compounds per year could be produced in this way, enough to supply practically the entire needs of the country. The dye situation is at present fairly satisfactory with respect to the cheaper dyes of the sulphide and azo class, but much remains to be done, and a long time may be expected to elapse before the finished organisation of the German dye industry can even be approached. Several special branches of the chemical trades have received a tremendous impetus during the war. Among these is the manufacture of sulphuric acid. This product has been essential in the manufacture of munitions, and the output has been increased until, late in 1918, the rate of output reached a level of 1,800,000 tons per annum. The exports of British chemicals, drugs and fertilisers are widely distributed. In 1913, France took 14 per cent. of the total of chemicals, so called; 13 per cent. went to the United States; Spain received 9 per cent.; 5 per cent. of the total was shipped to Australia; and Germany, India, Argentina, Holland, Canada and other countries received important quantities. The distribution in 1917 by leading countries was, roughly, as follows: France, 30 per cent.; British India, 9 per cent.; South Africa, 7 per cent.; Russia, nearly 6 per cent.; Australia, 5 per cent.; and the United States only 4 per cent."

Institute of Chemistry

Annual Meeting of the Birmingham Branch

DR. E. W. SMITH (chief chemist, Birmingham Gas Works) presided on Monday at the annual meeting of the Birmingham Branch of the Institute of Chemistry, held at the Chamber of Commerce Buildings. There was a representative attendance of industrial chemists.

The annual report, read by Mr. F. C. A. H. Lantsberry, M.Sc., hon. sec. (Birmingham Small Arms Co.), stated that since its inauguration in November last year the Birmingham Section had done excellent work. From the outset the committee decided that in matters of technical and scientific interest it would co-operate with the Birmingham and Midland Section of the Society of Chemical Industry, and would largely devote the attention of the section to discussion of professional matters, and to the organisation of the local qualified chemists. Five meetings had been held, and the following subjects were discussed: "The Remuneration of the Qualified Chemist"; "The Training of the Works Chemical Staff"; "State and Municipal-aided Laboratories and the Professional Chemist"; and "The Relations between the Chemist and Engineer."

The committee had arranged to hold a joint dinner with the Local Section of the Society of Chemical Industry; this would take place early next year. Mr. S. C. Farrar had resigned from the committee, consequent upon his removal to Scotland, and Mr. Rossiter, Dr. Parker and Mr. Webb retired, and were not eligible for re-election. With the committee's approval the Council of the Institute appointed Professor Frankland (late of the Birmingham University), Mr. H. Silvester, Dr. Twiss (Dunlop Co.), Dr. Smith, Mr. F. R. H. O'Shaughnessy (Consulting Chemist, Tame and Rea Drainage Board), and Mr. Lantsberry to act as a committee to interview local applicants for admission to the Institute without examination, and to advise the Council as to their suitability for election. Professor Frankland had expressed his desire not to act on that committee, and the committee had requested the Council to add the names of Professor Morgan, University of Birmingham, and Dr. Slater Price (Birmingham Technical School) to the committee. The number of members of the Institute who had definitely joined the Local Section stood at 50. The financial statement showed a small balance in hand.

The report was unanimously approved; Mr. N. P. Booth and Mr. S. R. Carter were appointed to the committee, two other vacancies to be filled later; and, on the motion of Mr. H. T. Pinnock, seconded by Mr. H. Silvester, Mr. Lantsberry was unanimously re-elected hon. sec. Mr. Lantsberry stated that there were about 140 members of the Institute of Chemistry in the Birmingham and Midland district, and it was hoped that a large proportion would join the local section.

Manure from Sludge

AN interesting commercial experiment in the production of manure from sewerage sludge, by chemical and other means, is to be made at the works of the Birmingham Tame and Rea District Drainage Board, who have just entered into an arrangement with the British Organic Fertilisers, Ltd., who intend to instal plant. Ald. Sayer, the chairman of the committee, explained that the Board have enormous mounds of sludge—the accumulation of years of work in the purification of the sewage before it is liberated into the river. Some years ago it was suggested that the Board should take steps, by installing plant, for manufacturing manure, but they felt that the problem was more or less in an experimental stage, and they did not respond. In 1914, however, an agreement was entered into with the Anglo-Continental Fertilisers Syndicate, but, owing to the war, no progress was made, and owing to the death of one of the chief promoters the company had been reconstructed under a new name. The Board's charges for electric current and for coal haulage were increased in accordance with present conditions. Ald. Sayer said the Board wished the company success, and that they would be willing to enter into a contract for the supply of all their sewerage sludge.

Synthetic Ammonia: New French Process

PROFESSOR D'ARSONVAL, according to a *Times* correspondent, made an important communication in the name of M. Georges Claude to the Academy of Science, Paris, on Monday. M. Claude recently showed that contrary to the generally received theory it was not only possible but strikingly easy to produce and turn to industrial uses pressures of 1,000 atmospheres and more. M. Claude has now succeeded in applying these very high pressures to the synthetic production of ammonia. Hitherto this had been done and applied only in Germany. M. Claude, however, has far outdistanced the German chemists. Under the new conditions discovered by him the combination of hydrogen and nitrogen takes place with such intensity that a very small apparatus is capable of a considerable output. M. Claude proposes shortly to exhibit to the members of the Academy a tiny apparatus in regular working order, capable of producing daily 200 litres (44 gallons) of liquid ammonia. Whereas the German chemist Haber only obtains one-third of a gramme of ammonia per catalytic gramme, M. Claude obtains ten grammes.

Wholesale Price of Benzol

Profit of 4¾d. per Gallon Allowed by Tribunal

THE first meeting of the Complaints Tribunal of the Central Committee was held on November 27 at the Windsor Hotel, Victoria Street, S.W., when a complaint lodged by the Woodcote Motor Co., of Epsom, with reference to the price charged for benzol by Messrs. S. Bowley & Son, Ltd., oil and spirit refiners, of Battersea Bridge Road, London was investigated.

The Secretary of the complainant company said his complaint was that he had been charged 2s. 6d. per gallon for benzol by the respondents. The benzol in question was delivered to his company at Epsom, in petrol tins which were unsealed. When benzol and petrol were delivered in unsealed tins, the retailers could not make any claim for shortage. Each tin was supposed to contain two gallons of spirit, but there were frequent shortages owing to "leakers." When sealed tins were delivered, the retailers could tell by the weight whether there was any shortage, and by returning the containers with the seal unbroken they were able to get an allowance. The witness produced an invoice showing that the Gas Light & Coke Co. had supplied benzol in sealed tins for 2s. 4d. per gallon. The Consett Steel & Iron Co. delivered benzol to the retailers' door in 50 gallon steel drums at the cost of 2s. 1d. per gallon. Benzol was retailed at 2s. 9d. per gallon, that price being fixed by the Trade Association, and the selling price was published in the trade papers. The price for selling benzol in bulk retail was 2s. 8d. per gallon. It was considered by the trade as a whole that a profit of 15 per cent. was sufficient for the retailers. In order to obtain that rate of profit benzol purchased at 2s. 6d. per gallon should be retailed at 2s. 10½d. per gallon. The witness pointed out that petrol was a foreign product, whereas benzol was produced in this country, and it was therefore advantageous for the sale of the latter to be pushed as much as possible.

The Chairman (Mr. A. A. Uthwatt) asked the witness what price he suggested he should be able to purchase benzol at, and was told that the price should be 2s. 4d. per gallon, at which figure it could be purchased by retailers from the Gas Light & Coke Co. He also produced a price list of the National Benzol Co., which quoted a price of 2s 4d. per gallon in two gallon tins.

The Witness agreed that he had written to the Board of Trade saying that the respondents should be able to obtain benzol at about 1s. 9d. to 1s. 10d. per gallon in bulk. If the respondents had to pay 2s. 1½d. per gallon for benzol, he still thought that they were asking too much in demanding 2s. 6d. from him. His suggestion was that a gross profit of 4¾d. per gallon was too much. A retailer could only get a profit of 15 per cent., and he did not think the wholesale d ealer should be entitled to as much.

Mr. Thomas Henry Hoare, sales manager to the respondents, said their business was an old established one, having been founded nearly 200 years ago. He admitted the charge of 2s. 6d. per gallon for benzol in the present case, and said that in July, 1914, they purchased similar stuff for 10½d. to 11d. per gallon, and sold it to retailers at 1s. 3½d. per gallon. On those figures they made a profit of about 31 per cent. The petrol in question they obtained from the Abbey Mills, West Ham. They sent a four or five-ton lorry with two men, and took delivery of the benzol in bulk, for which they paid 2s. 1½d. per gallon. The traveller for the district in which the complainants lived received a commission of 1½ per cent. on the order, while the expenses of the lorry were about £5 per day. The benzol had to be specially delivered, and the net result of the transaction was an estimated loss to the respondents of 30s. to £2.

A representative of the Explosives and Chemical Section of the Government Surplus Disposal Board said that last August the Government offered between 2½ to 3 million gallons of benzol, which was sold in bulk at the stores at an average price of 1s. 8½d. per gallon. In the course of that sale the Government entered into negotiations with the manufacturers, and it was ascertained that the cost of production was 1s. 3d. per gallon. They had definite knowledge that producers—at any rate one firm at Norwich—was selling at 1s. 9d. per gallon at the works. Asked if he had formed an estimate of the cost of benzol to the middleman from the quantity sold by the Government, he replied that for delivery in bulk it would be in the region of 2s. 1d. per gallon. The whole of the Government supply went to big dealers, and there was not much chance of the smaller people getting any.

The Chairman said the facts were simple, and it seemed that the respondents sold to complainants some 400 gallons of benzol at a price of 2s. 6d. per gallon. The committee had seen and examine l the books of the respondents, and had found beyond all doubt that in pre-war days they purchased benzol at 10d. or 11d. per gallon in bulk, and handed it to retailers in two-gallon tins at a price of 1s. 3½d. per gallon. The profit before the war was 4½d. to 5½d. per gallon, while in the present case the profit was 4¾d. per gallon. Out of that profit had to come the expenses of collection and delivery. The committee were of opinion that no case of profiteering had been made out, and nothing could be alleged against the respondents. The Chairman added: "It is quite clear that in relation to benzol there is some attempt being made to make a corner in this trade, and we propose to pass the matter to the Committee which sits under the Profiteering Act in connection with Trusts and Combines."

From Week to Week

THE REGISTERED OFFICES of the Premier Oil Company have been removed to Winchester House, Old Broad Street, E.C. 2.

DR. J. E. STEAD has been nominated president of the Iron and Steel Institute for next year, in succession to Mr. E. Schneider.

AN OFFICIAL DECREE has been issued in Belgium forbidding the importation, manufacture and sale of cocaine, opium, morphine and heroin.

THE GOVERNMENT has issued a proclamation prohibiting the importation of sulphur and copper sulphates into Greece until September, 1920.

THE BOARD OF TRADE (Licensing Section) announce that scrap iron, steel scrap and nitrate bags have been removed from List "A" of Prohibited Exports.

PROFESSOR R. B. ABELL has been appointed head of the Department of Chemistry, and Dr. L. L. Lloyd, head of the Department of Dyeing at Bradford Technical College.

DR. JACOB GROSSMANN, Ph.D., F.I.C., F.S.C., &c., who died on Friday, November 28, in Manchester, was a recognised authority on cyanide recovery and an original member of the Society of Chemical Industry.

IT IS STATED that the importation of phosphates into Italy from America has decreased considerably owing to the high freights, and there is now a shortage of phosphates in that country, part of which has been met by supplies from Tunis and Algiers.

THE MINISTER OF MUNITIONS has suspended the operation of the Tungsten and Molybdenite Order, 1917, which dealt with Tungsten-bearing Ores and Tungsten Metal Alloys and Salts and Molybdenite and Molybdenum Metal, Alloys and Salts, as from October 17, 1919.

THE FIRST CONSIGNMENT since the outbreak of war of German aniline dyes, consisting of 165 barrels, has reached the United States, consigned to the New York Colour & Chemical Co. The shipment came under the Tariff Act of September 8, 1916, the duty being 50 per cent. ad valorem.

THE NEW INDUSTRIAL COURT came into operation on Monday. This court takes the place of the Court of Arbitration, which concluded its work last week. The Industrial Court will probably sit at 5, Old Palace Yard, where the business of the Court of Arbitration has been transacted.

THE NEW PLANT of the Brunner Mond Co. of Canada for the production of soda ash at Amherfburg, Ont., has started operations. The daily output is stated to be 50 tons, compared with a capacity of 125 tons. The undertaking is entirely self-contained, power plants, salt wells and limestone all being situated on the property.

THE BRITISH SCIENCE AND KEY INDUSTRIES EXHIBITION at Kelvin Hall, Glasgow, which was officially arranged to run for a fortnight, proved so successful that, in response to numerous requests, the Glasgow Corporation decided to keep it open for a further period. In consequence, large numbers of people have again visited the exhibition this week.

ACCORDING TO *Stubbs' Weekly Gazette*, the failures in the United Kingdom for the week ended November 29 were 34, an increase of 18. The number of bills of sale registered and re-registered was 158, an increase of 99. Mortgages and charges registered by limited companies amount to £2,647,560, the amount authorised (where stated) being £1,554,000.

DR. J. S. NORRIS, professor of general chemistry in the Massachusetts Institute of Technology, describing his impressions of an extended tour of inspection of the leading German chemical works, said that the success of the German factories was the result of excellent organisation. Their methods, however, were in no way superior to those adopted and put into practice by American chemical manufacturers.

ON AND AFTER DECEMBER 1 the prices announced by the Board of Agriculture and Fisheries in Leaflet No. F.P. 494, S. 1, regarding high-grade potash salts recently acquired by the Government from Germany will be raised by 5s. per ton. Manure mixers, merchants, dealers and co-operative societies should in future send their orders to the Fertiliser Manufacturers' Association, Ltd., 155, Fenchurch Street, London, E.C. 3.

THE COUNCIL OF LIVERPOOL UNIVERSITY in their report state that one of the most urgent needs is a new chemical laboratory, the cost of which will be at least £200,000. The council have secured a site, and plans of a handsome and up-to-date building have been prepared, but nothing further can be done until the necessary funds are provided. Temporary accommodation is being found for a large number of chemistry students and three military huts erected in the quadrangle, but this temporary arrangement is unsatisfactory.

AT TUESDAY'S MEETING of the Bath City Council the clause in the minutes of the Sanitary Committee suggesting that the city's analytical work should be conducted by the Somerset county analyst at Weston-super-Mare, was referred back by a substantial majority. The ex-Mayor said there were analysts practising in Bath; and another suggestion was that the work might be done in Bristol. The chairman of the Sanitary Committee said the proposed arrangements were expected to save £50 a year. His committee had very carefully considered the matter, and the Somerset County Council had an up-to-date laboratory.

THE HEADQUARTERS AND LIBRARY of the Mining Institute of Scotland have been removed from 39, Elmbank Crescent, to the Royal Technical College, George Street, Glasgow, and all communications should be addressed to the secretary at that address. The library of the College contains all the principal technical journals, and may be freely consulted by members, who will also have the privilege of consulting or borrowing any of the books in the library belonging to the Royal Technical College.

MR. SIDNEY FRANK WATERS, sole partner in the firm of S. F. Waters & Co., 85, Gracechurch Street, E.C. 3, announces that, owing to his taking a less active part in the business, he is admitting into partnership his two sons (Mr. Eric Noel Waters and Mr. Hardy Bedwell Waters, who for the past four years have been serving in H.M. Forces in France and Belgium) and Mr. Philip William Milner, who has been associated with him for fifteen years and in the army for the last two years. The name of the firm will remain as at present.

THE FIRST SHIPMENT of nitrogen was recently made from the plant of the American Nitrogen Products Co., at Lake Buntzer, Burrard Inlet, British Columbia, to a foreign port, when a large order was consigned to Japan. The shipment was an experimental one, but good orders are expected to follow. About $500,000 has been invested in the plant, which has been producing for the local market for a short time. It is claimed by the company that good shipping facilities and cheap power makes it possible for them to compete with any company on the Pacific Coast so far as price is concerned.

A LARGE AMERICAN DYES COMBINE is in contemplation. The capital value is stated to be 15 million dollars and the companies to be amalgamated are the Union Dye & Chemical Co., New York; the American Aniline Products, New York; the Rollin Chemical Corporation, New York, with plants at Charleston, W. Va., Johnson City, Tenn., and Evington, Va., and the Clinchfield-Chemical Co., Johnson City, Tenn. It is understood that the president of the new company will be Mr. B. R. Armour, now president of American Aniline Products.

A BULLETIN issued by the National Research Council of the United States announces that the Council has decided, with the co-operation of the American Physical and Chemical Societies, to compile and issue an American Compendium of Physical and Chemical Constants. It is to be both critical and up to date, and to this end the universities and research laboratories of America are to be asked to supply the constants at present known. The business and industrial concerns are then to be asked what other constants are required in their work, and the joint committee charged with the issue of the Compendium will see that they are determined and included in the work. The cost is estimated at £20,000.

AN INQUEST WAS OPENED AT BURY last Saturday on David Hutton, a colour mixer's labourer, employed at the Tottington mill of the Calico Printers' Association, and was adjourned until December 10. In the course of his work Hutton opened a cask of sulphide of soda, and the next day told the foreman that he had got a mouthful of gas from the cask and had had a restless night. He continued his work for some time, but consulted a doctor, who in evidence said that Hutton's condition coincided with certain symptoms of sulphide poisoning. It was a typical case of gas poisoning. The foreman said that he had known of no one permanently affected as the result of topping these casks. It was work done by hundreds of men all over the country, and Hutton had been at it for six years. The works manager also said that he had never heard of anyone poisoned by opening a barrel of sulphide of soda. In adjourning the inquiry the coroner said it was in the interests of the family and of the industry to do so.

PROFESSOR HENRY LOUIS, speaking at a meeting of the Newcastle Branch of the Institution of British Ironfounders on "The proper system of technical education of the ironfounder," said it was a matter of profound regret that, at Armstrong College, Newcastle, there was not the proper equipment for teaching the science of metallurgy as it ought to be taught. The metallurgists in the North-East district did not appear to have realised what they owed to themselves and their industry, no less than to the leading educational institution in the district. They had never made the slightest effort to equip a metallurgical department worthy of that important industry. He mentioned the case of a blacksmith leaving his job because he could make no more than £20 a week and, on the same day, he noticed an advertisement for a teacher of metallurgy at £250 a year. He did not begrudge the blacksmith his £1,000 a year, but he did claim that the man who was cabable of teaching the blacksmith the principles underlying his work was worth a good deal more than one quarter of his wages. A properly staffed and properly equipped metallurgical department would be the centre of research for the entire district. He urged, as a business proposition, that it would be worth while establishing such an institution where problems could be worked out which would benefit the industry as a whole.

Chemical Matters in Parliament

Fertilisers

Mr. Hohler asked the Parliamentary Secretary to the Ministry of Munitions if he would give the names of the articles comprised under the head, Fertilisers Account, on which profit of £237,000 was made; and explain how they make this profit, and state what profit per ton his Department makes and exactly what his Department does to earn this profit?

Mr. Hope: The articles comprised under the head "Fertilisers" are phosphate rock, pyrites and sulphate of ammonia. The sum of £237,000 mentioned in the question does not represent profit, but is the excess of cash receipts over cash payments for the period under review, namely, April 1, 1919, to September 30, 1919. This is a very different thing from a realised profit on the transaction as a whole.

Mr. Hohler: What does the Government do to earn this money?

Mr. Hope: They sell the material to the best advantage.

Earl Winterton: Will the hon. gentleman give an undertaking that this profit has not been made by selling fertilisers to farmers at a price greater than the Department gave for them?

Mr. Hope: It is not profit. My noble friend may have an excellent balance at his bankers on one day, but it does not follow on that account that he is living within his income.

Mr. Holmes: Does that imply that the stock in hand has not been taken into account, and, therefore, the profit is far more than the figure shown on the Paper?

Mr. Hope: The stock has not yet been disposed of. The transaction began before the beginning of this financial year, and I do not know whether it will be concluded within the financial year.

Lever Brothers

Mr. Sugden asked the President of the Board of Trade (House of Commons, December 1) whether his attention had been drawn to the recent absorption of Messrs. Loaders & Nucoline, Ltd., by Messrs. Lever Brothers, Ltd.; whether he was aware that this was a continuation of a policy which had been followed for some time by the firm in question; whether trust-like operations of this nature were threatening with extinction a large number of smaller firms who were thus finding it more and more difficult to obtain suitable supplies of materials; and whether he proposed to take any action in the matter?

Sir A. Geddes: Investigations into a number of combinations, including one into the position in the soap industry, are being made under Section 3 of the Profiteering Act by the Standing Committee on Trusts, and I propose to await their reports before considering what further action, if any, is desired and practicable.

German Dyes

In reply to Major M'Kenzie Wood (House of Commons, December 1), Sir A. Geddes stated that approximately 200 tons out of a quantity of about 650 tons so far requisitioned were now on the way, but had not yet been received. The Reparation Commission had not been formally established, and consequently no final decision had been taken as to the values to be credited to Germany. The prices to be charged to consumers would be announced shortly.

Spelter

Replying to Mr. Bird (House of Commons, December 2), Mr. Bridgeman stated: Under an agreement made in September, 1918, between the Ministry of Munitions and the British Zinc Smelters, spelter produced from zinc ore purchased with the approval of the Ministry was taken by that Department at a standard price plus increased costs of fuel and labour. This agreement was in force until November 5 last, and under it the prices paid to the producers by the Government were considerably in excess of the prices realised on sale to consumers; but I am not at present in a position to state the actual loss resulting from the arrangement, which was entered into to avoid the closing down of the smelting works. Losses incurred up to May 5 were to the account of the Ministry of Munitions, and after that date to the account of the Board of Trade.

Basic Slag

Sir Arthur Boscawen (Parliamentary Secretary to the Board of Agriculture), in reply to Mr. Forestier-Walker (House of Commons, December 2), stated that it was quite possible to obtain basic slag of a higher percentage of total phosphates than 24 per cent. During the five months ending October 31, 1919, the total deliveries of basic slag containing upwards of 24 per cent. total phosphates amounted to 66,200 tons. The real cause of any shortage that might exist was the greatly increased demand. The production of high-grade slag was not directly dependent on the agricultural demand, but was primarily a question of steel works practice. Over this practice the Board had no control.

Linseed Cake

In reply to Mr. Romer (House of Commons, December 2), Mr. Roberts stated that local shortages of linseed cake had been caused in certain districts by lack of sufficient railway and other transport to ensure prompt distribution from the mills to agricultural areas; but there was no general shortage. The export of 5,000 tons of American linseed cake to Holland was permitted as a special measure in order to relieve congestion at the ports. The licence to export was granted to Mr. J. Zwaardemaker.

Hereford Munitions Factory

Mr. Kellaway, in reply to Mr. Pulley (House of Commons, December 2), said that the future use to which the national filling factory, No. 14, Rotherwas, Hereford, was to be put had not yet been decided. A proposal was under consideration for using the factory to meet a portion of the requirements for high explosives and high explosive filling under peace conditions, but until the nature and magnitude of these requirements were more clearly known, it was quite impossible for any estimate to be formed of the number of workpeople likely to be employed.

Phosphate Rock from Algiers

Mr. Harry Hope asked the Parliamentary Secretary to the Board of Agriculture (House of Commons, December 3) whether, in view of the necessity for securing a full supply of superphosphates, he would take steps to enable phosphate rock from Algiers being imported, instead of the low grade and inferior quality of phosphate rock at present being brought in from America.

Sir A. Boscawen: Arrangements have already been made for the importation of phosphate rock from Algiers and Tunis, which will bring up the total deliveries from these countries to the United Kingdom to 277,000 tons during 1919. Arrangements have also been discussed with the French authorities for delivery of a substantially larger quantity during 1920. The matter is receiving the close attention of the Board.

Chemical Trade Hampered by Lack of Transport Facilities

Mr. Henderson asked the Minister of Transport (House of Commons, December 3) whether he was aware that the caustic soda and bleaching powder plants in Widnes of the United Alkali Co., Ltd., employing from 1,500 to 2,000 men, would be shut down within a few days unless facilities were afforded for transporting lime from Buxton; whether he was aware that there were 5,000 tons of limestone waiting at Buxton which could not be brought to Widnes in consequence of the lack of waggons; and whether he would take special action in this case in order to prevent the enforced unemployment of so many men.

Mr. A. Neal (Parliamentary Secretary to the Ministry): Waggons for limestone are provided by quarry owners, but whenever possible the railway company have in the past supplemented the supply, and will continue to do so. I understand that the United Alkali Co.'s reason for requiring additional waggons now is due to the fact that they relinquished last July 75 waggons which they had on hire.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 4, Queen Anne's Gate Buildings, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

Locality of Firm or Agent.	Materials.	Ref No.
Canada (Montreal and Toronto)	Glass	1,091
Canada	Glass. Replies to Canadian Government Trade Commissioner's Office, Portland House, 73, Basinghall Street, London, E.C.2.	
Belgium (Liege)...	Pharmaceutical Products and Chemists' Supplies	1,100
Belgium (Liege)...	Icemaking Machines and Aniline Dyes.	1,101
Belgium (Liege)...	Cement, Pottery, Refractory Products, &c.	1,103
Germany (Wiesbaden)	Oils; steel cylinders (for oxygen, hydrogen and carbonic acid gas)	1,113
Portugal (Oporto)	Drugs	1,119
Brazil (Porto Alegre)	Chemicals and Drugs	1,175

References to Current Literature

Only articles of general as distinct from specialised interest are included and given in alphabetical order under each geographical subdivision. By publishing this digest within two or three days of publication or receipt we hope to save our readers time and trouble; in return we invite their suggestions and criticisms. The original journals may be consulted at the Patent Office or Chemical Society's libraries. A list of journals and standard abbreviations used will be published at suitable intervals.

British

APPARATUS. A clip for preventing rubber connections from slipping off glass and metal tubing, and for attaching pressure pumps to taps. C. A. Keane and G. Patchin. *J. Soc. Chem. Ind.*, November 29, 391T.

CARBON DIOXIDE. Carbonic acid gas. *Industrial Gases*, December, 38-41. Notes on the properties and manufacture of carbon dioxide.

CHARCOAL. Vegetable decolorising carbons. A. B. Bradley. *J. Soc. Chem. Ind.*, November 29, 396-398T. Experiments on the decolorisation of sugar solution by "Norit" under various conditions are described.

COKE. Moisture in blast furnace coke. W. H. George. *J. Soc. Chem. Ind.*, November 29, 394-396T. Notes on the sampling and testing of coke for moisture.

FUNGICIDES. The ammonium polysulphide wash. J. V. Eyre, E. S. Salmon and L. K. Wormald. *J. Bd. Agric.*, November, 821-822. The preparation of these fungicides and their testing are dealt with.

GAS. Water-gas. J. S. McNicol. *Gas World*, November 29, 437-438. Paper read before the Scottish Junior Gas Association, November 22. Trend of carbonising plant in the United States. *Gas World*, November 29, 440-441. Notes on the report of the Carbonisation Committee of the American Gas Association.

GERMANY. Notes on Rhineland chemical works. J. Allan. *J. Soc. Chem. Ind.*, November 29, 427-429R. This part of the paper deals with labour conditions and recent plant extensions. (See also CHEMICAL AGE, p. 623.)

IRON. Magnetic and mechanical testing of iron. *Engineering*, November 28, 708-712. A report of five papers from the U.S. Bureau of Standards read at a recent meeting of the American Society for Testing Materials.

MUSTARD GAS. A further note on mustard gas. W. J. Pope. *J. Soc. Chem. Ind.*, November 29, 422-423R. A reply to a paper by Prof. Green. (See CHEMICAL AGE, p. 527.)

NAPHTHALENE. Manufacture of pure naphthalene from coal gas. J. A. Davy. *Gas J.*, December 2, 489-491. Paper read before the Coke Oven Managers' Association, Sheffield, November 29.

OILS. The change of refractive indices of fixed oils with temperature. C. H. Wright. *J. Soc. Chem. Ind.*, November 29, 392-394T. A useful paper, in which the subject is discussed mathematically. (See CHEMICAL AGE, p. 596.)

PENCILS. Black lead pencils and their pigments in wri ing. C. A. Mitchell. *J. Soc. Chem. Ind.*, November 29, 383-391T. An interesting paper, giving analyses of graphites and notes on the differentiation of pencil markings. (See also CHEMICAL AGE, p. 571.)

PETROLEUM. Some ware problems of petroleum supply. F. Black. *J. Inst. Pet. Tech.*, June, 251-285. Presidential Address to the Institution of Petroleum Technologists.

The chemist and engineer in relation to the petroleum industry. F. M. Perkin and T. C. Palmer. *J. Inst. Pet. Tech.*, June, 285-312.

POTASH. Some chemical aspects of the potash industry in Great Britain. E. C. Rossiter and C. S. Dingley. *J. Soc. Chem. Ind.*, November 29, 375-383T. A valuable paper, containing many interesting tables. (See also CHEMICAL AGE, p. 544.)

STATISTICS. The use of statistical work in chemical industry. *J. Soc. Chem. Ind.*, November 29, 430-432R. A review of the report of the statistical work of the Factories Branch Dept. of Explosives Supply. (See also CHEMICAL AGE, p. 506.)

STEEL. The hardening of steel. H. C. H. Carpenter. *Chem. News*, November 28, 248-251. A further instalment of the paper noted in CHEMICAL AGE, p. 645.

Colonial

INDIGO. The loss of indigo caused by bad settling and the means of avoiding this. The use of dhak gum and its effect on yield and quality. W. A. Davis. *Indigo Pubn. No. 3, Agric. Res. Inst., Pusa.* 16 pp.

The future prospects of the natural indigo industry. Effect of superphosphate manuring on the yield and quality of the indigo plant. W. A. Davis. *Indigo Pubn. No. 4, Agric. Res. Inst., Pusa.* 19 pp.

An improved method of preparing indican from indigo-yielding plants. B. M. Amin. *Indigo Pubn. No. 5, Agric. Res. Inst., Pusa.* 9 pp.

French

ELECTRO-METALLURGY. Progress of electro-metallurgy in the United States. M. Altmayer. *Mem. Soc. Ing. Civ., France.* July-September: 364-383. Notes on a tour undertaken by an Industrial Mission in 1918-1919.

United States

AMMONIA. A new absorbent for ammonia respirators. G. St. J. Perrott, M. Yablick and A. C. Fieldner. *J. Ind. Eng. Chem.*, November 1, 1013-1016. The use of pumice impregnated with copper sulphate is described.

BUREAU OF MINES. Dedication of the Pittsburgh Station, U.S. Bureau of Mines. *J. Ind. Eng. Chem.*, November 1, 1066-1070; also *Chem. and Met. Eng.*, October 1, 432-436. The accounts include interesting descriptions of the building and its equipment.

CHARCOAL. Charcoal in Sweden. J. W. Beckman. *J. Ind. Eng. Chem.*, November 1, 1063-1064. Some notes on the industry, with statistics, are given.

CHLORINE. Observations regarding chlorine cells. F. G. Wheeler. *Chem. and Met. Eng.*, October 1, 436-438. Useful notes on the construction and operation of cells for electrolysing salt.

DYES. Contributions from the Dye Section of the American Chemical Society. *J. Ind. Eng. Chem.*, November 1, 1071-1083. A report of the Philadelphia meeting, September 4, including introductory remarks by C. L. Reese, and papers by R. E. Rose, "Foreign Dye Patents, their Relation to the Development of the American Dye Industry"; B. Humiston, W. S. Calcott and E. C. Lathrop, "Explosibility and Inflammability of Dyes"; E. F. Hitch and J. E. Knapp, "Some Problems in the Identification of Dyes"; W. H. Watkins, "Observations on the Estimation of the Strength of Dyestuffs"; E. K. Strachan, "The Place of Physical Chemistry in Dyestuff Research."

EXPLOSIVES. Hygroscopic properties of black powder. G. B. Taylor. *J. Ind. Eng. Chem.*, November 1, 1032-1034. The rates of absorption of moisture by powder have been studied.

FOODS. Low-temperature food dehydration. K. G. Falk, E. M. Frankel and R. H. McKee. *J. Ind. Eng. Chem.*, November 1, 1030-1040. An account of the dehydration of meat, fish, fruit and vegetables by a vacuum process.

LITHARGE. Colorimetric determination of lead dioxide in litharge. W. V. Morgan. *J. Ind. Eng. Chem.*, November 1, 1055. The use of aniline for this purpose is recommended.

MERCURIALS. Bibliography of the literature of organic mercurials. F. C. Whitmore. *J. Ind. Eng. Chem.*, November 1, 1083-1091.

MUSTARD GAS. Effect of moisture content on the permeability of fabrics to mustard gas. G. H. Clowes, G. St. J. Perrott, B. Gordon and E. L. Greensfelder. *J. Ind. Eng., Chem.*, November 1, 1016-1018.

Patent Literature

We publish each week a list of selected complete specifications accepted as and when they are actually printed and on sale. In addition, we give abstracts within a week of the specifications being obtainable. Readers can thus decide what specifications are of sufficient interest to warrant purchase, the only way of obtaining complete information. A list of International Convention specifications open to inspection before acceptance is added, and abstracts are given as soon as possible.

Abstracts of Complete Specifications

114,617. PETROLEUM PITCH, DESTRUCTIVE DISTILLATION OF. K. Nomi, 1987, Sugamomura, Kitatoshimagun, Tokyo Province, Japan. International Convention date (Japan), April 4, 1917.

Petroleum pitch is gradually heated in a cast-iron or fire-clay retort up to 500°–600°C., and the distillate collected in a condenser. One ton of pitch yields about 450 kilos of coke, 250 kilos of condensable distillate containing about 60 per cent. of volatile oil boiling below 110°C., and about 6,000 cubic feet of gas, chiefly hydrogen. The distillate is fractionated, and the residue mixed with about ten times its quantity of pitch and returned to the retort.

121,727. AMMONIUM PERCHLORATE, MANUFACTURE OF. D. Aanensen, Lokkeveien, 9, Christiania. International Convention date (Norway), December 22, 1917.

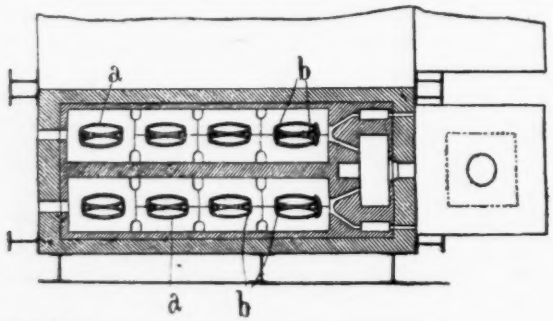
Sodium perchlorate solution is mixed with an excess of ammonium nitrate solution, and ammonium perchlorate is precipitated and separated. The liquor is then treated with ammonium bicarbonate, or ammonia and carbon dioxide, in such proportions that sodium bicarbonate is precipitated and ammonium nitrate remains in solution with other salts of sodium and ammonium. The solution is then used for treating a further quantity of sodium perchlorate.

123,522. HYDROCARBONS, RECTIFICATION OF. De Bataafsche Petroleum-Maatschappij, Carel van Bylandtlaan 30, The Hague, Holland, and J. H. C. de Brey, Statenlaan 102, The Hague, Holland. International Convention date (Holland), February 21, 1918.

Apparatus is described for separating mixtures of hydrocarbons which may be partly liquid and partly vapour, such as natural gas containing petrol, gases obtained by distilling rock-oils or bituminous shales, &c. The mixture, *e.g.*, "casing-head gasoline," is compressed to 20 atmospheres pressure, and then heated to 125°C. by means of a steam coil. The resulting liquid and vapour are led into a rectifying column at different points by separate pipes, the pressure being kept at 19 atmospheres by means of regulating valves. The liquid condensing at the bottom is kept at 150°C. by means of a steam coil, and the vapour passes out of the top into a condenser, to recover all condensable fractions. The condensate is sprayed into the top of the rectifying column. The gasolene collected at the bottom is thus freed from gas and light fractions. When the starting material is entirely gaseous, the preliminary heating is omitted.

134,236. DESTRUCTIVE DISTILLATION OF CARBONACEOUS MATERIALS. Dr. F. M. Perkin, 59, New Oxford Street, London, W.C.1., and Nitrogen Products and Carbide Co., Ltd., Winchester House, Old Broad Street, London, E.C.2. Application date, February 19, 1918.

The apparatus is for the distillation of coal and other carbonaceous material at low temperature to increase the yield of tar, tar oils and aliphatic hydrocarbons. Large vertical or inclined retorts, *a*, of fire clay, silica, or the like, are made of elliptical cross section, two or more retorts being built together. Channels *b* are thus provided in the walls of the retorts for superheating gas or steam, which is afterwards passed through openings into the retorts.



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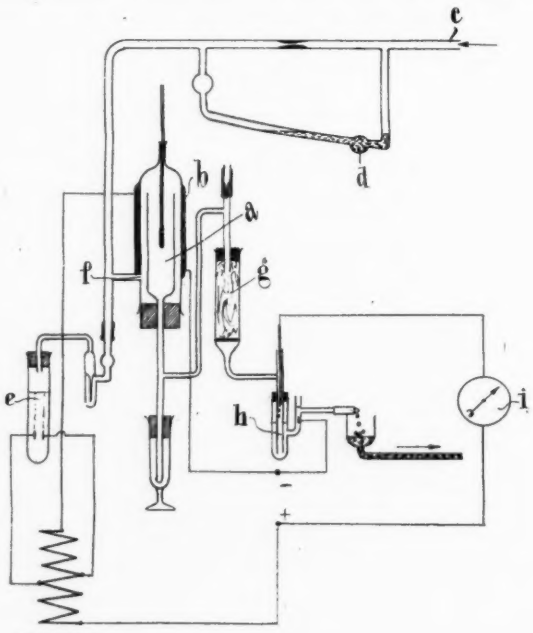
134,237. AMMONIA AND AMMONIUM COMPOUNDS, PROCESS OF PRODUCING. G. G. Taylor, 282, Noble Avenue, Crafton, Pa., U.S.A., and I. E. Knapp, Jun., 1232, Highland Avenue, Coraopolis, Pa., U.S.A. Application date, March 13, 1918.

A metal oxide, *e.g.*, lime, is mixed with coal, and coked in a by-product oven to produce an intimate mixture of lime and coke, which is then withdrawn and crushed. The mixture is then treated in an electric furnace to produce the metal carbide which is withdrawn and crushed. The carbide is mixed with a catalyst such as a metal chloride or fluoride, and heated in a furnace in a current of nitrogen. When the temperature is kept below 1,000°C. a cyanide is formed, having the formula $M_2N_2C_2$, where M is a divalent metal. The cyanide is saturated with water and then heated gradually up to 450°–500°C. Ammonia and carbon dioxide are liberated, and are passed to a condenser. The solution is treated in any desired way to obtain ammonia or ammonium carbonate.

134,243. CARBON MONOXIDE IN HYDROGEN OR GASES CONTAINING THE SAME, APPARATUS FOR INDICATING AND/OR RECORDING QUANTITIES OF—APPLICABLE ALSO FOR LIKE PURPOSES. Dr. E. K. Rideal, 48A, Cornwall Gardens, London, S.W.7, and Dr. H. S. Taylor, 41, Windle Street, St. Helens, Lancs. Application date, June 4, 1918.

The gas to be tested is freed from impurities such as carbon dioxide and hydrogen sulphide, and passed through a tube *c*, and meter *d*, to a chamber *f*, containing an iron-chromium-cerium-oxide catalyst heated to 200°–250°C. by means of an electric resistance coil *b*. Oxygen and hydrogen are generated electrolytically in the vessel *e*, and are also passed into the



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vessel *a*, where the carbon monoxide is converted into dioxide. The gas is then passed through an absorption column *g*, containing lime water, which absorbs the carbon dioxide. The lime water then passes into a small electrolytic cell *h*, where its conductivity can be measured. The conductivity of the lime water gives a measure of the quantity of carbon dioxide absorbed, and consequently of the amount or carbon monoxide originally present, and this may be recorded on a recorder *i*.

134,250. BENZYL CHLORIDE AND BENZAL CHLORIDE AND CERTAIN HOMOLOGUES AND SUBSTITUTION PRODUCTS OF THESE COMPOUNDS, PRODUCTION OF. Levinstein, Ltd., Dr. H. Levinstein, and Dr. W. Bader, Crumpsall Vale Chemical Works, Blackley, Manchester. Application date, July 27, 1918.

Aromatic hydrocarbons of the benzene series are stirred into an emulsion with a hypochlorite solution, preferably below 0°C., and the hypochlorous acid is gradually set free by the addition of an acid. The product of the reaction is separated from the aqueous layer, and purified by fractional distillation. Examples are given of the treatment of toluene to produce benzyl chloride, and the treatment of benzyl chloride to produce benzal chloride. Aromatic hydrocarbons, which are substituted in the nucleus by one or two chlorine atoms or in the side chain by one chlorine atom, such as mono-chloro-toluenes, and 2 : 4–dichloro–toluene may be similarly treated.

134,265. CELLULOSE, FERMENTATION OF. The Power-Gas Corporation, Ltd., and H. Langwell, Parkfield Works, Stockton-on-Tees. Application date, October 1, 1918.

Cellulose is aerated by forcing air through it, and a small proportion of fermenting vegetable matter added to it, and the mixture stirred. A substance such as finely divided calcium carbonate is added to keep the mass neutral, inorganic nutrients such as potash, phosphoric acid, magnesia and nitrogen compounds are added, and also a primer consisting of a carbohydrate such as one of the sugars. When the mass is heated to about 60°C., fermentation takes place, and acetic or other fatty acids, and combustible gases are produced. At lower temperatures, the results are similar, but fermentation is slower.

134,270. COLOURING MATTERS AND LAKES THEREFROM, PRODUCTION OF. Dr. W. R. Brass, Thornhill House, Dale Road, Spondon, Derbyshire. Application date, November 15, 1918.

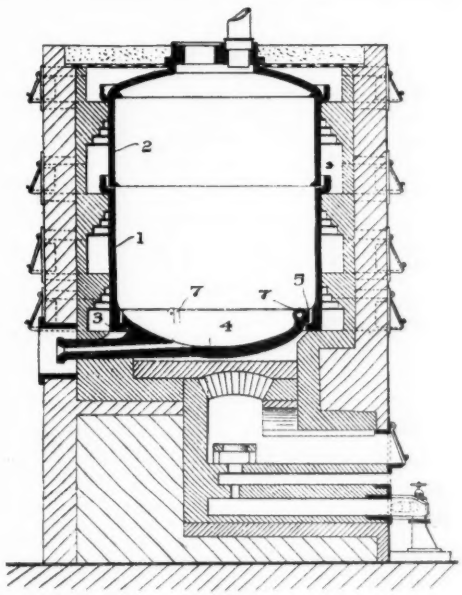
Lithol red R, prepared by combining 2–naphthylamine–1–sulphonic acid with 2–naphthol, is found to be soluble when heated with freshly prepared ammonium sulphite solution. This compound may be employed for the production of lakes by treating it in the presence of a substratum with sodium or potassium carbonate.

134,313. PRECIPITATES, FOR EXAMPLE PIGMENTS, FORMATION OF. F. G. Kidd and Wilkinson, Heywood & Clark, Ltd., Storers Wharf, Poplar, London, E. Application date, October 30, 1918.

In order to form precipitates by double decomposition of aqueous solutions, the two solutions are converted into spray, and the sprays are mixed. The method may be applied to the production of chrome yellow by the action of lead acetate and a soluble chromate. When oxidation or reduction are required, the sprays may be produced by a blast of the appropriate gas, or in an atmosphere of the gas. An inactive atmosphere may also be used when required.

134,406. RETORTS AND STILLS. J. Prentice, 11, The Ridge, East Riggs, Dumfriesshire. Application date, December 9, 1918.

Retorts and stills used in the distillation of oils, acids, &c., are made with a detachable bottom, so that renewal of the whole retort is not necessary in the event of damage to the bottom. A cast-iron retort is made in two superposed sections, 1, 2, open at both ends. The lower end of section 1 is provided with an internal flange 3, on which rests the flange 5 of the concave bottom 4. An acid proof packing may be used to seal the joint. The other sections of the retort may be made with spigot and socket joints as shown. The bottom may be



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formed with a spout when required, and lugs, 7, may be provided so that the bottom may be lifted out for renewal when necessary without dismantling the brickwork.

134,415. FILTER PRESS PLATES. W. O. Mason, 150, Woodhouse Lane, Leeds. Application date, December 19, 1918.

The press is of the type in which the material is treated under pressure between a series of fluted press plates. The invention consists in making each press plate of an outer rectangular wooden jointed frame, held together by bolts, and enclosing an inner corrugated plate of glass, preferably reinforced with wire.

134,454. GAS GENERATORS. E. Svensson, 25–27, Augustagade, Copenhagen, and M. A. Crank, 5, Bulgariensgade, Copenhagen. Application date, February 11, 1919.

A vertical gas generator suitable for low-grade moist fuel, such as waste wood or peat, is worked with a downward draught of air. One or more openings are arranged in the wall a short distance above the grate, and the outer end of each opening is connected to a point at the middle zone of the generator by means of a short tube passing outside the generator. The side openings are provided with cross bars to retain the fuel. Some of the hot air and steam passing downward through the fuel passes out through the short tubes, and in again at the openings below. The gas produced finally passes out through water seals at the bottom.

International Specifications Open to Inspection

133,027. FATTY ACIDS. Pardubitzer Fabrik der Akt.-Ges. fur Mineralol–Industrie vorm. D. Fanto & Co., Pardubitz, Austria. International Convention date, September 25, 1918. Addition to 131,301.

Paraffin wax is oxidised as described in 131,301 (*see* THE CHEMICAL AGE of October 25), but instead of regulating the temperature by regulating the air supply after the reaction has started, it is regulated by circulating a cooling medium through the heating coil of the apparatus. When catalysts, such as the acids mentioned in 131,302 (*i.e.*, oleic, naphthenic, or colophonic—*see* THE CHEMICAL AGE of October 25) are used, the product is not discoloured.

133,041. CATALYTIC PROCESSES. L. Duparc, Ecole de Chimie, and C. Urfer, 8, Rue de Chantepoulet, Geneva. International Convention date, September 24, 1918.

Ammonia gas obtained by heating a strong aqueous solution, but not by passing oxygen through it, is mixed with oxygen in the proportion of 4 volumes of ammonia to 7 volumes of oxygen, and passed over a catalyst heated to 500°–650°C.

The catalyst is a metal of the platinum group preferably rhodium, distributed on asbestos. Nitrogen peroxide is produced, and is passed into water at 30°C. to obtain nitric acid.

133,045–6. Furnaces. H. Hecker and Bender & Frambs Ges., Hagen, Westphalia, Germany. International Convention dates, May 2, 1918, and September 10, 1918, respectively. 133,046 is an addition to 133,045.

133,045. The air conduits are formed of hollow bricks of hexagonal cross-section placed end to end. The bricks are arranged in rows crossing one another at right angles, so that parallel conduits of square cross-section are formed by the sides of four adjacent bricks. The hot waste gas is passed through the square conduits.

133,046. A construction and arrangement of bricks is described for connecting the ends of the air conduits.

Latest Notifications.

135,510. Catalysts. Process for the manufacture of. A. Brochet. May 1, 1915.

Specifications Accepted, with Date of Application

120,726. Gas analysing apparatus. Registering mechanism for. Aktiebolaget Ingeniorsfirma F. Egnell. Nov. 8, 1917.

122,167. Benzene. Catalytic oxidation of. Barrett Co. January 5, 1918.

134,555. Sulphur dioxide from gases which contain the same. Process for the removal and recovery of. Norddeutsche Hutte Akt.-Ges., and J. Behrens. February 15, 1916.

134,562. Ammonium nitrate. Manufacture of. J. R. Partington and G. J. Jones. February 1, 1918.

134,563. Synthetic shellac, resin, or the like. Production of. W. T. Robinson-Bindley, A. W. Weller, and E. Dulcken. February 27, 1918.

134,564–5. Celluloid, vulcanite and the like. Production of substitutes for. W. T. Robinson-Bindley, A. W. Weller, and E. Dulcken. February 27, 1918.

134,567. Petroleum and the like. Method of and apparatus for distilling. E. C. R. Marks (*Cleveland Trust Co.*). April 24, 1918.

134,572. Ammonia from High-Pressure Gases. Removal of. E. B. Maxted and T. A. Smith. August 3, 1918.

134,593. Concentrating Solutions. H. V. Welch. October 30, 1918.

134,607. Saccharine Materials. Decolorising and Purification of. J. J. Hood, J. Clark, and P. G. Clark. November 4, 1918.

134,618. Grinding Mills, Disc and like. J. R. Torrance. November 5, 1918.

134,626. Magnesia. Process for the Manufacture of. J. C. Delage. November 8, 1917.

134,665. Potassium Salts from Blast Furnace Slag. Recovery of. E. Bury, O. Ollander, T. Smith, and F. Bainbridge. December 3, 1918.

134,715. Sulphonates of Aromatic Hydrocarbons for Use in Making Phenolic Bodies. Manufacture of. F. Corbellis. February 6, 1919.

134,766. Liquid Fuel. E. C. R. Marks (*U.S. Industrial Alcohol Co.*). April 30, 1919.

Iuternational Convention Patents

Official announcement is made that the provisions of Section 91 of the Patents and Designs Act of 1907 will apply to Poland, taking effect from November 20, 1919. Section 91 relates to the conditions under which Patent applications are received from certain foreign countries under the International Convention and granted priority of date corresponding to the date of the foreign application.

Sodium Sulphate in Saskatchewan

Deposits estimated to contain 9,000,000 tons of sodium sulphate are being worked near Saskatoon, in the vicinity of Muskiki Lake, near Kaskakee Springs, on the Prince Albert branch of the Grand Trunk Pacific Railway. The deposit consists of a double salt composed of sodium and magnesium, and is commonly known as Glauber's salts, or salt cake sulphate. At present the crude natural is being shipped to Kitchener, Ont., to the plant of the Salts and Potash Co. for refinement. Similar deposits, having an area of 8 square miles with a maximum thickness of 8 inches, in a lake at Oban, Sask., are to be developed by the White Shou Chemical Co., Ltd. - L. H.

Patent Office Library

To the Editor of The Chemical Age.

Sir,—Will you kindly draw the attention of your readers to the accompanying copy of a Petition asking the President of the Board of Trade to have the Patent Office Library kept open until 10 p.m. daily? The Petition has the approval of a number of scientific and technical societies, and I shall be glad to forward sheets for signature by any others who are interested, as also to hear from individuals who wish their names added, but have not an opportunity of signing in person.—Yours, &c.,

Chas. Salter.

33, Park Hall Road, E. Finchley, N. 2.
December 3, 1919.

To the Right Honourable the President of the Board of Trade.

We, the undersigned, beg to ask that you will authorise the Patent Office Library to be re-opened to the public until 10 p.m. daily, as was the practice for over twenty-five years before the war, viz., from about 1888 to 1914.

The Patent Office Library, which is maintained from national funds, is acknowledged to contain the most valuable collection of current and other technical literature in this country, if not in the world, and is consulted daily by a large number of readers. Unfortunately the hour for closing prevents the fullest use of the Library being made by many readers who are engaged during the day-time in chemical, engineering and other technical works, in the outskirts; and these readers are therefore deprived of access to information that they cannot obtain elsewhere.

We are aware that it has now been decided to open the Library until 8 p.m. from the 1st instant, but we believe that, in making this proposal, the authorities of the Patent Office have not fully appreciated the position of the aforesaid readers, who cannot reach the Library until a comparatively late hour. Moreover, these readers belong to a class that should be specially encouraged at the present time, when there is great need for improvement in the technical condition of our industries: and to exclude them from the sources of information contained in the Patent Office Library is, therefore, adverse to the national interest.

Consequently we venture to hope that you will recognise our request as reasonable and well founded, and will take the necessary action to give it effect.

10s. Reduction on Coal

The Board of Trade have made an Order reducing by 10s. per ton the pithead price of all coal despatched from collieries in Great Britain on or after December 1, for household and domestic purposes in the United Kingdom. The order provides that the reduction of 10s. per ton shall also apply to coal supplied for the production of gas and electricity for household and domestic purposes. The order entails a reduction of 10s. per ton (or 6d. per cwt.) in the maximum retail prices of house coal and instructions to this effect have been issued to Local Fuel Overseers, who have at the same time been requested to review the present retail prices of gas coke in view of the reduction in the price of coal. Factors, merchants and dealers ordering coal for resale for domestic or household purposes are required to give the seller a certificate to the effect that the coal will be resold or used exclusively for such purposes. Coal shall be deemed to be bought or sold for domestic or household purposes only when it is bought or sold for the purpose of supplying consumers under the provisions of the Household Fuel and Lighting Order, 1919.

Directions have also been issued by the Controller of Coal Mines under which all coal supplied by collieries for bunkering ships engaged in the coasting trade of the United Kingdom (including fishing vessels, tugs, &c.) on and after December 1 (including coal supplied under existing contracts) shall be charged at fixed prices specified in schedule appended to the directions. These are the present Schedule A prices, less 6s. per ton. These revised bunker prices correspond as closely as practicable with the present home limitation prices for industrial coal. Where bunker coal is sold to a broker, merchant or exporter, the broker's, merchant's or exporter's commission on resale must be charged by way of addition to the colliery price.

Magnesite Industry of Canada

Though the ultimate prospects for the magnesite industry in Canada are good at present, conditions are quiet, and it is not expected that the high production record of 1918 will be repeated for 1919. In 1918 the total production of magnesite in the province of Quebec (the chief source of the Dominion) was 28,564 tons, valued at $1,016,764. In the opinion of many Canadian magnesite can compete successfully with that of either Austria or Greece. While the proportion of lime in Quebec magnesite is higher than that of Austrian yet by strict chemical control in its manufacture, all free lime has been eliminated from the Quebec product, and a finished article is produced, the equal of either that of Austria or Greece.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

British Market Report

THURSDAY, December 4, 1919.

TRADE continues brisk, but there has not been quite the same activity as we reported last week. The tone, however, is very good, and prices on the whole show an upward tendency.

The export demand continues extremely brisk, but very much more trade is offered than can be satisfactorily dealt with. Delivery dates named by manufacturers become more and more distant. There seems to be an increase in orders placed for import from America, notwithstanding the continued decline in the exchange.

General Chemicals

ACID ACETIC remains very active and with the uncertain date of arrivals available spot supplies are eagerly absorbed.

ACID CARBOLIC.—Manufacturers are heavily committed, and the continued demand makes for higher prices.

ACID FORMIC is in good demand, which is, of course, influenced by the scarcity of ACETIC ACID.

ACID OXALIC is again firmer, and there is now practically no foreign make offering, and some of the expected supplies of this material have not come to hand.

AMMONIUM SALTS are becoming scarce, and many makers are fully sold for near delivery. CARBONATE has been advanced a penny per lb.

ARSENIC continues very firm and active, but is without change in price.

BARIUM SALTS.—There is practically no change in the position. The market continues weak, more especially for CHLORIDE.

BLEACHING POWDER.—More business in this material is being offered than can be satisfactorily transacted. Full figures are being paid even for low strength parcels.

COPPER SULPHATE.—There is very little movement in this product, but the slightly firmer tendency noted in our last issue continues, and there is little doubt that with a small increase in demand the price would rise sharply.

FORMALDEHYDE.—The situation is no easier. Spot supplies are negligible. Normal price is unchanged.

IRON SULPHATE (GREEN COPPERAS) is moving off slightly better, but trade, however, is by no means active.

LEAD ACETATE.—There is a better feeling with this material, and business is more active. Price is again firmer.

LITHARGE is very firm and makers are now well sold ahead.

LITHOPONE is very scarce on the spot, and higher prices are being realised for near delivery.

POTASSIUM BICHROMATE is active, especially on export account.

POTASSIUM CARBONATE.—There is no change in price and spot supplies are being readily absorbed.

POTASSIUM CAUSTIC.—Increased supplies of this material are expected shortly.

POTASSIUM CHLORATE is inclined to droop and trade passing is very small.

POTASSIUM PERMANGANATE is firmer in price for the B.P. material.

POTASSIUM PRUSSIATE is very firm with good business passing.

SODIUM ACETATE is not quite so active, but price is firm and unchanged.

SODIUM BICARBONATE is becoming more difficult to obtain on export account, and price continues to show a firmer tendency.

SODIUM CHLORATE is slow of sale and weak.

SODIUM CAUSTIC is very firm and scarce. There are few re-sale parcels in the market for which there is a large demand for export.

SODIUM HYPOSULPHITE is again firmer and very scarce for near delivery.

SODIUM NITRITE is now practically unobtainable on the spot owing to strikes in Norway, and high prices are being paid for odd deliveries which become available.

SODIUM PHOSPHATE is firmer, and some good business has been transacted at the prevailing level.

SODIUM PRUSSIATE is without change as regards price, and makers expect higher figures in the near future. Very little material can be obtained for near delivery.

SODIUM SULPHIDE is in slightly better request and price is hardening.

SULPHUR has been more active, especially FLOWERS.

TIN SALTS are about as they were, and prices are firm in sympathy with the Metal.

ZINC SALTS are slightly more active without changes in price.

Coal Tar Intermediates

Trade on the whole continues very active and satisfactory, and the delivery question, however, is again the factor, but it is worthy of note that the American makers are also pretty heavily sold ahead.

ACET ANILIDE is unobtainable for delivery this year, and price is firmer.

ALPHA NAPHTHOL is active and moving off steadily.

ANILINE OIL continues very firm, and still more business has been placed at current figures for delivery over the early months of next year.

ANILINE SALT remains scarce, but without change in value.

BENZIDINE BASE is enquired for, and is in short supply.

BETA NAPHTHOL.—Makers continue to be well occupied, and the price is nominally without change.

H. ACID is in better demand.

PARAPHENYLINE DIAMINE is also better, and some export orders have been received.

SALICYLIC ACID continues very brisk, but price is without change.

Coal Tar Products

The market is still firm and fairly active.

90% BENZOL.—There is more demand for export, but the quantity available is extremely limited. The value to-day is 2s. to 2s. 1½d. per gallon f.o.b.

CRESYLIC ACID.—The higher price asked by manufacturers appears to have checked business, as buyers are unwilling to pay over 2s. 6d. to 2s. 7½d. per gallon for 97/99%.

CREOSOTE OIL.—The demand for export continues good, but the quantity available for prompt shipment is small, and there is no change in price.

NAPHTHALENE.—Refined is steady at £18 to £20 per ton, and Crude is selling at £6. 10s. to £9 according to quality.

SOLVENT NAPHTHA.—The demand is good and quantity offering for near delivery very limited. To-day's quotations are 2s. 10d. to 2s. 11d. per gallon.

HEAVY NAPHTHA.—The demand is small, but the quantity offering is limited, and prices are steady at 2s. 3d. to 2s. 4½d. per gallon.

PITCH.—Manufacturers are offering only limited quantities, and prices are unchanged.

Sulphate of Ammonia

There is still none available for export, and there is no change in the official price for Home trade.

French Market Report

Trade in France has been fairly active, although the adverse exchange meditates against business to a certain extent.

There is a more hopeful outlook forward, and the larger buyers are now more inclined to place contracts for delivery during the early months of 1920.

ACID ACETIC is in request and available supplies are being absorbed at approximately £65 to £70 per ton for 80%.

ACID LACTIC.—Only a moderate amount of business is passing in this product at equal to about £72 per ton.

ACID OXALIC is in keen demand.

ALUM is badly wanted, and good orders have been placed for delivery in the Spring at equal to £24 to £25 per ton C.I.F.

AMMONIUM SALTS are all in good request.

BICHROMATES are in request at makers' prices.

LEAD SALTS are moving off steadily, and the demand for ACETATE is better at equal to about £88 per ton C.I.F.

NAPHTHALENE SALTS are stagnant with a very moderate amount of business to report.

SODIUM SALTS are generally steady and active. There is a keen demand for BISULPHITE for this country, but makers are unable to give near delivery.

SODIUM SULPHIDE is moving off steadily at equal to about £26 per ton C.I.F. for concentrated.

ZINC SALTS are better, and a fair amount of trade has been done in OXIDE and SULPHATE.

Current Prices

Chemicals

	per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	2	9	to	0	3	0
Acetone oil	ton	77	0	0	to	80	0	0
Acetone, pure	ton	95	0	0	to	97	0	0
Acid, Acetic, glacial, 99-100%	ton	83	0	0	to	85	0	0
Acetic, 80% pure	ton	65	0	0	to	67	10	0
Arsenic	ton	65	0	0	to	70	0	0
Boric, cryst.	ton	72	10	0	to	73	10	0
Carbolic, cryst. 39-40%	lb.	0	0	9	to	0	0	9½
Citric	lb.	0	4	3	to	0	4	4
Formic, 90%	ton	105	0	0	to	110	0	0
Gallic, pure	lb.	0	6	3	to	0	6	6
Hydrofluoric	lb.	0	0	7	to	0	0	8
Lactic, 50 vol.	ton	70	0	0	to	72	0	0
Lactic, 60 vol.	ton	85	0	0	to	87	10	0
Nitric, 80 Tw.	ton	37	0	0	to	39	0	0
Oxalic	lb.	0	1	5	to	0	1	5½
Phosphoric, 1.5	ton	40	0	0	to	42	0	0
Acid, Pyrogallic, cryst.	lb.	0	11	6	to	0	11	9
Salicylic, Technical	lb.	0	2	0	to	0	2	2
Salicylic, B.P.	lb.	0	2	9	to	0	3	0
Sulphuric, 92-93%	ton	7	10	0	to	8	0	0
Tannic, commercial	lb.	0	3	6	to	0	3	9
Tartaric	lb.	0	3	2	to	0	3	3
Alum, lump	ton	19	0	0	to	19	10	0
Alum, chrome	ton	93	0	0	to	95	0	0
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	15	0	0	to	15	10	0
Aluminium, sulphate, 17-18%	ton	18	10	0	to	19	0	0
Ammonia, anhydrous	lb.	0	1	9	to	0	2	0
Ammonia, .880	ton	32	10	0	to	37	10	0
Ammonia, .920	ton	20	0	0	to	24	0	0
Ammonia, carbonate	lb.	0	0	7½	to		—	
Ammonia, chloride	ton	65	0	0	to	70	0	0
Ammonia, muriate (galvanisers)	ton	45	0	0	to	46	0	0
Ammonia, nitrate	ton	45	0	0	to	50	0	0
Ammonia, phosphate	ton	115	0	0	to	120	0	0
Ammonia, sulphocyanide	lb.	0	1	10	to	0	2	0
Amyl, acetate	ton	300	0	0	to	310	0	0
Arsenic, white, powdered	ton	62	0	0	to	64	0	0
Barium, carbonate	ton	13	0	0	to	14	0	0
Barium, carbonate, 2- 4%	ton	13	10	0	to	14	10	0
Chlorate	lb.	0	1	3	to	0	1	4
Chloride	ton	21	0	0	to	22	0	0
Nitrate	ton	50	0	0	to	51	0	0
Sulphate, blanc fixe, dry	ton	25	10	0	to	26	0	0
Sulphate, blanc fixe, pulp	ton	15	10	0	to	16	0	0
Bleaching powder, 35-37%	ton	17	10	0	to	18	0	0
Borax crystals	ton	3	0	0	to	40	0	0
Calcium acetate, grey	ton	23	0	0	to	25	0	0
Carbide	ton	28	0	0	to	30	0	0
Chloride	ton		0	0	to	9	10	0
Carbon bisulphide	ton	58	0	0	to	59	0	0
Casein, technical	ton	80	0	0	to	83	0	0
Cerium oxalate	lb.	0	3	9	to	0	4	0
Chromium acetate	lb.	0	1	0	to	0	1	2
Cobalt acetate	lb.	0	7	0	to	0	7	6
Oxide, black	lb.	0	7	9	to	0	8	0
Copper chloride	lb.	0	1	3	to	0	1	6
Sulphate	ton	42	0	0	to	43	0	0
Cream Tartar, 98-100%	ton	245	0	0	to	250	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde 40% vol.	ton		—			165	0	0
Formusol (Rongalite)	lb.	0	4	0	to	0	4	3
Glauber salts	ton	3	0	0	to	3	5	0
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	8	to	0	2	9
Iron perchloride	ton	40	0	0	to	42	0	0
Iron sulphate (Copperas)	ton	4	10	0	to	4	15	0
Lead acetate, white	ton	83	0	0	to	85	0	0
Carbonate (White Lead)	ton	55	0	0	to	57	0	0
Nitrate	ton	62	0	0	to	63	0	0
Litharge	ton	49	0	0	to	50	0	0
Lithophone, 30%	ton	45	0	0	to	46	10	0
Magnesium chloride	ton	15	10	0	to	16	10	0
Carbonate, light	cwt.	2	15	0	to	3	0	0
Sulphate (Epsom salts commercial)	ton	11	10	0	to	12	0	0
Sulphate (Druggists')	ton	17	19	0	to	18	0	0
Methyl acetone	ton	89	0	0	to	90	0	0
Alcohol, 1% acetone	gall.	0	11	6	to	0	12	0
Nickel ammonium sulphate, single salt	ton	47	10	0	to	52	10	0
Potassium bichromate	lb.	0	1	6	to	0	1	7
Carbonate, 90%	ton	102	0	0	to	105	0	0
Chloride	ton	Nominal.						
Chlorate	lb.	0	1	2	to	0	1	3
Meta-bisulphate, 50-52%	ton	235	0	0	to	245	0	0
Nitrate, refined	ton	61	0	0	to	62	0	0
Permanganate	lb.	0	3	6	to	0	3	9
Prussiate, red	lb.	0	6	0	to	0	6	3
Prussiate, yellow	lb.	0	1	11	to	0	2	0
Sulphate, 90%	ton	31	0	0	to	33	0	0
Salammoniac, firsts	cwt.	4	10	0	to		—	
Seconds	cwt.	4	5	0	to		—	
Sodium acetate	ton	48	0	0	to	50	0	0
Arsenate, 45%	ton	50	0	0	to	52	0	0
Bicarbonate	ton	10	0	0	to	10	10	0
Bichromate	lb.	0	0	10	to	0	0	11
Bisulphate, 60-62%	ton	32	10	0	to	33	10	0
Chlorate	lb.	0	0	5½	to	0	0	6¼
Caustic, 70%	ton	25	10	0	to	26	10	0
Caustic, 76%	ton	26	10	0	to	27	0	0
Hydrosulphite, powder, 85%	lb.	0	3	3	to	0	3	6
Hyposulphite, commercial	ton	19	10	0	to	20	0	0
Nitrite, 96-98%	ton	61	10	0	to	62	10	0
Phosphate, crystal	ton	32	0	0	to	35	0	0
Sodium, Perborate	lb.	0	2	2	to	0	2	4
Prussiate	lb.	0	1	1	to	0	1	1½
Sulphide, crystals	ton	16	0	0	to	16	10	0
Sulphide, solid, 60-62%	ton	24	10	0	to	25	10	0
Sulphite, cryst.	ton	11	10	0	to	12	0	0
Strontium, carbonate	ton	85	0	0	to	90	0	0
Nitrate	ton	85	0	0	to	90	0	0
Sulphate, white	ton	8	10	0	to	10	0	0
Sulphur chloride	ton	40	0	0	to	42	10	0
Flowers	ton	24	0	0	to	26	0	0
Roll	ton	23	0	0	to	25	0	0
Tartar emetic	lb.	0	3	4	to	0	3	6
Tin perchloride, 33%	lb.	0	2	5	to	0	2	6
Perchloride, solid	lb.	0	2	7	to	0	2	9
Protochloride (tin crystals)	lb.	0	1	10	to	0	1	11
Zinc chloride, 102 Tw.	ton	22	0	0	to	23	10	0
Chloride, solid, 96-98%	ton	50	0	0	to	52	10	0
Oxide, 99%	ton	77	10	0	to	80	0	0
Oxide, 94-95%	ton	60	0	0	to	62	10	0
Dust, 90%	ton	70	0	0	to	72	10	0
Sulphate	ton	21	10	0	to	23	0	0
Oxide, Redseal	ton	75	0	0	to	80	0	0

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	3	0	to	0	3	6
Alphanaphthol, refined	lb.	0	3	6	to	0	3	9
Alphanaphthylamine	lb.	0	2	7	to	0	2	9
Aniline oil, drums free	lb.	0	1	4	to	0	1	5
Aniline salts	lb.	0	1	8	to	0	2	0
Anthracene, 85-90%	lb.	0	1	5	to	0	1	6
Benzaldehyde (free of chlorine)	lb.	0	6	6	to	0	7	0
Benzidine, base	lb.	0	6	6	to	0	7	6
Benzidine, sulphate	lb.	0	6	0	to	0	6	6
Benzoic, acid	lb.	0	5	0	to	0	5	3
Benzoate of soda	lb.	0	5	0	to	0	5	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	1	6	0	to	1	7	6
Betanaphthol	lb.	0	2	9	to	0	3	0
Betanaphthylamine, technical	lb.	0	6	6	to	0	7	0
Croceine Acid, 100% basis	lb.	0	4	9	to	0	5	0
Dichlorbenzol	lb.	0	0	5	to	0	0	6
Diethylaniline	lb.	0	7	0	to	0	7	6
Dinitrobenzol	lb.	0	1	3	to	0	1	4
Dinitrochlorbenzol	lb.	0	1	2	to	0	1	3
Dinitronaphthaline	lb.	0	1	4	to	0	1	6
Dinitrotoluol	lb.	0	1	7	to	0	1	8
Dinitrophenol	lb.	0	1	3	to	0	1	6
Dimethylaniline	lb.	0	3	0	to	0	3	3
Diphenylamine	lb.	0	3	0	to	0	3	3
H-Acid	lb.	0	11	6	to	0	12	0
Metaphenylenediamine	lb.	0	4	9	to	0	5	0
Monochlorbenzol	lb.	0	0	9	to	0	0	10
Metanilic Acid	lb.	0	7	6	to	0	8	6
Monosulphonic Acid (2:7)	lb.	0	7	0	to	0	8	0
Naphthionic acid, crude	lb.	0	3	3	to	0	3	6
Naphthionate of Soda	lb.	0	4	0	to	0	4	6
Naphthylamin-di-sulphonic-acid	lb.	0	4	6	to	0	5	0
Nitronaphthaline	lb.	0	1	2	to	0	1	3
Nitrotoluol	lb.	0	1	3	to	0	1	6
Orthoamidophenol, base	lb.	0	18	0	to	1	0	0
Orthodichlorbenzol	lb.	0	1	1	to	0	1	3
Orthotoluidine	lb.	0	2	2	to	0	2	3
Orthonitrotoluol	lb.	0	1	6	to	0	1	9
Para-amidophenol, base	lb.	0	14	0	to	0	15	0
Para-amidophenol, hydrochlor	lb.	0	15	6	to	0	16	0
Paradichlorbenzol	lb.	0	0	4	to	0	0	5
Paranitraniline	lb.	0	4	0	to	0	4	6

	per	£	s.	d.		£	s.	d.
Paranitrophenol	lb.	0	1	10	to	0	2	0
Paranitrotoluol	lb.	0	5	3	to	0	5	6
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	13	0
Paratoluidine	lb.	0	7	0	to	0	7	6
Phthalic anhydride	lb.	0	9	0	to	0	10	0
R. Salt, 100% basis	lb.	0	4	0	to	0	4	2
Resorcin, technical	lb.	0	11	0	to	0	12	0
Resorcin, pure	lb.	0	17	6	to	1	0	0
Salicylic acid	lb.	0	2	9	to	0	3	9
Salol	lb.	0	4	9	to	0	5	6
Shaeffer acid, 100% basis	lb.	0	3	6	to	0	3	0
Sulphanilic acid, crude	lb.	0	1	4	to	0	1	5
Tolidine, base	lb.	0	10	0	to	0	10	6
Tolidine, mixture	lb.	0	2	9	to	0	3	0

Miscellaneous and Paint Materials

Barytes	ton	11	0	0	to	13	0	0
Casein	ton	75	0	0	to	80	0	0
Chalk, precipitated (light)	ton	20	0	0	to	24	0	0
Chalk, precipitated (heavy)	ton	10	0	0	to	12	0	0
China clay (bags extra) (f.o.r. Cornwall)	ton	1	12	6	to	3	12	6
Coke (blast furnace) (S. Wales)	ton	2	12	0	to	3	0	0
Coke (foundry) (S. Wales)	ton	3	5	0	to	3	10	0
Fuller's Earth	ton	4	0	0	to	5	0	0
Lead, litharge flake	ton	49	10	0	to	50	10	0
Lead, red	cwt.	2	5	0	to	2	7	6
Lead, white	cwt.	2	15	0	to	2	17	6
Ultramarine	ton	90	0	0	to	110	0	0
Prussian Blue	cwt.	11	0	0	to	11	10	0
Chrome green	cwt.	6	5	0	to	6	10	0
Chrome yellow	cwt.	6	5	0	to	7	0	0
Mineral black	ton	10	0	0	to	12	0	0
Carbon black	lb.	0	1	3	to	0	1	6
Guignet's Green, 30%	lb.	0	1	5	to	0	1	6

Building Materials

Bricks, stock	1000	4	0	0	to	4	2	0
Bricks, blue Staffs	1000	9	2	0	to	9	4	0
Firebricks, Stourbridge	1000	10	7	6	to	10	12	0
Fireclay, Stourbridge	ton	2	2	0	to	2	4	0
Glass, sheet, 21 oz.	ft.	0	0	8½	to	0	0	8¾
Lime, ground blue Lias	ton	3	0	0	to	3	2	0
Lime, grey stone	ton	3	0	0	to	3	2	0
Linseed oil, boiled	gall.	0	10	0	to	0	10	6
Linseed oil, raw	gall.	0	9	6	to	0	10	0
Portland cement	ton	3	10	0	to	3	15	0
Slates, Bangor	1200	32	0	0	to	35	0	0
Slates, Portmadoc	1200	18	0	0	to	22	0	0
Tiles	1000	6	5	0	to	6	7	0
Turpentine	gall.	0	11	0	to	0	11	6
Yellow pine up to 3×8	standard	40	0	0	to	45	0	0
Yellow pine over 3×8	standard	45	0	0	to	55	0	0

Alsatian Potash Prices

IMPORTS for the week ending November 29, 1,541 tons Sylvinite 14 per cent., and 950 tons Sylvinite 20 per cent. Prices: Sylvinite, 14 per cent. (French Kainit), £7 per ton; Sylvinite 20 per cent (French Potash Salts), £8 7s. 6d. per ton; Muriate of Potash 80 per cent., £19 7s. 6d. per ton.

Nitrate of Lime

NITRATE OF LIME is again on the market, but now in granular form. Sales are being effected at £19 to £20, c.i.f. British port.

THE NEGOTIATIONS between the Amalgamated Society of Pharmacists, Drug and Chemical Workers and the United Chemists' Association, Ltd., Cheltenham, for putting into operation the union's national wages rates have broken down. A ballot of the staff shows that a large majority are in favour of at once withdrawing their labour. This will affect some 250 employees but will also mean the holding up of direct supplies to about 3,000 retail chemists throughout the country who are members of the Association.

A *Reuter's* MESSAGE states that a geyser spouting petroleum has been discovered in the State of Durango, Mexico. In order to determine whether the region possesses oil sufficient to warrant exploitation the Government has sent a force of engineers to make a survey.

Pots for Picric Acid Manufacture

MR. WILLIAM HASSELL, trading as C. W. Outram, fireclay manufacturer, of Woodville, Derby, was plaintiff in an action partly heard at Derby and concluded in London on Tuesday, December 2, by Mr. Pollock, High Courts Official Referee, in which he claimed against Brooke's Chemical Co., Ltd., £1,330 4s. for the supply of pots for the manufacture of picric acid.

The plaintiff's case was that the contract to supply the pots was partly verbal and partly in writing contained in certain letters which passed between the parties during September, 1915. The claim was made up of one account of £565 4s., another of £756, and a sum of £9 for discount on a previous account which defendants had agreed to pay.

The defendants did not admit the contract so far as the alleged verbal portion was concerned, and said that it was wholly contained in the letters which passed between the parties in July, 1917. They admitted that a discount of £9 had been deducted in error, but said that it was duly credited in a subsequent account and paid. They denied indebtedness so far as £565 was concerned, and claimed that they were entitled to set off against the plaintiff's claim the price of goods which were not in accordance with the contract and were defective and unfit for the purpose for which the defendants required them. They denied having ordered 108 80-gallon pots which, at the date of their refusal to accept them, were, they said, not in a deliverable state. Generally they alleged that the pots were not equal to sample and that some of them cracked and broke soon after they were put into use, in consequence of which they lost a good deal of material, about 55 lb. per 80-gallon pot, and 27½ lb. per 40-gallon pot, of the value of 2s. 2d. per lb. They had suffered loss in this way from 70 80-gallon pots to the extent of at least £417 and about £9 from the 40-gallon pots. They contended that they were justified in refusing to take delivery of 108 pots, and while denying indebtedness paid £183 0s into Court. They counterclaimed £474 for pots which were defective and not in accordance with contract, and £426 in respect of pots which broke when used.

The Official Referee, in giving judgment, said that he was satisfied that the defendants had made out their case that the goods were not in accordance with contract. The plaintiff therefore failed in his claim for £565, and the defendants succeeded in their counterclaim. In the result he found for the defendants on the claim and on the counterclaim for £2 11s. 5d., with an order for payment out to them of the £183 paid into Court.

Successful Appeal Against Arbitration Award

MR. JUSTICE BAILHACHE, sitting in the King's Bench Division on Wednesday, had before him an arbitration appeal in the case of the British and French Chemical Manufacturing Company, Ltd., against Ofverburg & Co.

This was a special case stated by Arbitrators, in regard to a contract for the sale of 20 tons of sulphide of sodium made in June, 1917. In May, 1918, the British and French Chemical Manufacturing Co. had not delivered the goods under the contract, and the matter went to arbitration, with the result that the delivery of the whole of the 20 tons was to be made in October, November and December, 1918. The company did not carry out the award, and the goods were not delivered. The matter again went to arbitration, and the arbitrators in their award found that there had been a breach of contract on the part of the sellers by reason of their failure to make any of the deliveries under the first award. The sellers asked for a special case to be stated for the opinion of the Court, as to whether upon the true construction the first award constituted a valid and binding contract for the sale of goods.

His Lordship remarked that this was really a case of a claim for damages for breach of contract. The contract was ended, and there had been a complete breach. What power had the Arbitrators to fix dates of deliveries, when there were no such dates in the contract? He was asked whether on the true construction of the first award it was a valid and binding contract for the sale of goods by the Chemical Manufacturing Co., and the answer to that was obviously "No." It was not a contract at all.

Mr. Allen for the Defendants, asked that the case might go back to the Arbitrators.

His Lordship: No. If people will go to arbitration they must put up with the disadvantages of it. The award is not a valid and binding contract.

THE FOLLOWING PLANS have been passed: Additions to property at the corner of Mackie Street and St. John Street, Port Dundas, Glasgow, for Mackie & Co., distillers, Ltd.; a boiler house and dye house at Ellistones dyeworks, for Drinkwater & Smith, Greetland; temporary buildings for the Premier Dyeing & Finishing Co., Buxton Road, Leek.

Company News

UNITED PREMIER OIL & CAKE.—Interim dividend of 5 per cent., free of tax.

DOMINION GLASS.—Quarterly dividend of 1 per cent. ($1 per share), less tax, on common stock, payable January 1. Last year, dividend same.

BRITISH CYANIDES.—Interim dividend of 10 per cent. per annum (1s. per share), free of tax, on ordinary for half-year, payable December 16. Last year, dividend same.

GEEVOR TIN MINES.—At the annual general meeting of the Geevor Tin Mines a resolution was passed increasing the capital of the company to £380,000 by the creation of 180,000 shares of 10s. each.

LODERS & NUCOLINE.—Final dividend on the Ordinary shares of 12½ per cent. (*i.e.*, at the rate of 25 per cent. for the half-year ended August 31), making 20 per cent. for the year ended August 31, less tax.

BLEACHERS' ASSOCIATION.—The directors declare a dividend at the rate of 8 per cent. for the half-year, or 4 per cent. actual, against 2½ per cent. actual a year ago. The gross profits were £782,457 and the net profit £570,940, and £546,831 is carried forward to next half-year.

ALBY UNITED & NITROGEN PRODUCTS.—Extraordinary general meetings of shareholders of the Alby United Carbide Factories, Ltd., and the Nitrogen Products & Carbide Co., Ltd., were held at Winchester House last week, when the necessary resolutions regarding the amalgamation were confirmed.

ANGLO-PERSIAN OIL.—At an extraordinary meeting of shareholders held in London on Monday, Sir Charles Greenway (chairman) presiding, a resolution to increase the capital of the company to £20,000,000 by the creation of 15,000,000 new shares of £1 each was unanimously passed.

HUELVA COPPER AND SULPHUR MINES.—After providing £1,173 against repairs to buildings, and writing £8,413 off development, the accounts show a loss of £4,227, from which must be deducted the credit balance of £1,748 brought in, leaving a debit balance of £2,481 to be carried forward.

CASTNER-KELLNER ALKALI CO.—Presiding at the annual meeting of the Castner-Kellner Alkali Co. in London on Wednesday, Mr. Gerald Balfour (chairman) said the past year's accounts were disappointing, but the reduction of the dividend from 20 to 13 per cent. is only temporary, and was directly traceable to the war. The report was adopted.

SULPHIDE CORPORATION.—Final dividends of a further 10 per cent. on the Preference shares and 15 per cent. on the Ordinary shares, making a total distribution of 15 per cent. on both classes of shares out of the profits for the year ended June 30, payable on January 3. For the corresponding period last year the total distribution on both classes of shares was 25 per cent.

COURTAULDS, LTD.—The directors of Courtaulds (Limited) have recommended to their shareholders the issue of one bonus share for each share held, based upon the capitalisation of the company's general reserve. The board are of opinion that the company's capital reserve investment in shares in the Viscose Company continues to appreciate in value, but they do not recommend that any action be taken at present in the way of the capitalisation of this reserve. A detailed statement of the proposal will be sent to the shareholders.

SANTA MARIA CONSOLIDATED OILFIELDS, LTD.—The directors offer for subscription 350,000 of the Cumulative Participating Preference shares of 8s. each. The company has been formed with a capital of £500,000 to acquire a controlling interest in the Santa Maria Oilfields Incorporated (Arizona), and to provide capital to develop the properties owned and controlled by that company. The above capital is divided into 625,000 10 per cent. Cumulative Participating Preference, and an equal number of Ordinary shares of 8s. each.

BRYANT & MAY.—An extraordinary general meeting of Bryant & May, Ltd., will be held at Fairfield Works, Bow, on December 10, for the purpose of considering a resolution to the effect that the capital of the company be increased from £1,480,000 to £2,000,000 by the creation of 520,000 new shares of £1 each, of which 320,000 shares shall be ordinary shares and the remaining 200,000 shares shall be partnership shares. It is also proposed to make various alterations in the articles of association, so that the scheme of co-operative profit sharing with the workers, referred to in the last annual report, may be carried into effect.

LIVERPOOL NITRATE.—The report for the year to June 30 last states that pursuant to the resolution for amalgamation with the Colorado Nitrate Co., Ltd., passed at an extraordinary general meeting held on November 28, 1918, the called-up capital of this company now stands at £64,800, divided into 259,200 shares of 5s. each fully paid. The assets and liabilities of the Colorado Nitrate Co., Ltd., are incorporated in the present balance-sheet. The premium paid upon the shares issued in exchange has been carried to a special account. The profit for the year was £84,355, and £12,432 was brought in, making £96,787. The directors recommend a further dividend of 5s. per share, free of tax, payable on December 5, making, with the interim dividend paid last May, a total of 7s. per share, free of tax, for the year.

Stocks and Shares

Commercial, Industrial, &c.

	Quotations Nov. 26	Dec. 3
Alby United Carbide Factories, Ord....	$\frac{5}{8}$–$\frac{3}{4}$	$\frac{13}{16}$–$\frac{15}{16}$
Associated Portland Cement Manufrs. (1900) Lim., Ord.....	25/6–26/6	25/0–26/0
Bell's United Asbestos Co., Lim., Ord.	$2\frac{1}{4}$–$2\frac{1}{2}$	$1\frac{9}{16}$–$1\frac{11}{16}$
Bleachers' Association, Lim., Ord.....	$1\frac{11}{16}$–$1\frac{13}{16}$	$1\frac{5}{8}$–$1\frac{15}{16}$
Borax Consolidated, Lim., Prefd. Ord.	4–4½	4–4½
Bradford Dyers' Assoc. Lim., Ord.....	$2\frac{7}{16}$–$2\frac{9}{16}$	$2\frac{5}{8}$–$2\frac{3}{4}$
British Aluminium Co., Lim., Ord.....	$1\frac{9}{16}$–$1\frac{11}{16}$	$1\frac{1}{2}$–$1\frac{5}{8}$
British Oil and Cake Mills, Lim., Ord...	$1\frac{3}{4}$–$1\frac{13}{16}$	$1\frac{31}{32}$–$1\frac{33}{32}$
British Portland Cement Manufrs., Lim., Ord.	30/6–32/6	30/6–32/6
Brunner, Mond & Co., Lim., Ord.....	$2\frac{1}{16}$–$2\frac{1}{4}$ ×d.	$2\frac{1}{16}$–$2\frac{3}{16}$
Castner-Kellner Alkali Co., Lim.....	$2\frac{1}{2}$–$2\frac{3}{4}$	$2\frac{1}{2}$–$2\frac{3}{4}$
China Clay Corporation, Lim., Ord.....	$\frac{1}{4}$–$\frac{3}{8}$	$\frac{1}{4}$–$\frac{3}{8}$
Cook (Edward) & Co., Lim., 4% 1st Mort. Deb. Stock Red.....	57–61	57–61
Courtaulds, Lim.....	$11\frac{1}{2}$–$12\frac{1}{2}$	$11\frac{1}{2}$–$12\frac{1}{2}$
Crosfield (Joseph) & Sons, Lim., Cum. 6% Prefce	$\frac{15}{16}$–1 $\frac{1}{16}$	$\frac{15}{16}$–1 $\frac{1}{16}$
Curtis's & Harvey, Lim.....	$2\frac{9}{16}$–$2\frac{13}{16}$	$2\frac{9}{16}$–$2\frac{13}{16}$
Electro Bleach.....	...	...
Explosives Trades, Lim., Ord.....	22/6–23/6	22/6–23/6
Field (J. C. & J.), Lim., Ord.....	1 $\frac{5}{16}$–1 $\frac{9}{16}$	$1\frac{1}{8}$–$1\frac{3}{8}$
Greenwich Inlaid Linoleum (Fredk. Walton's New Patents) Co., Lim., Ord.	$\frac{31}{32}$–$\frac{33}{32}$	$\frac{31}{32}$–$\frac{33}{32}$
Harrison & Crosfield, Lim., 10% Cum. Prefd. Ord.....	$1\frac{3}{8}$–$1\frac{1}{2}$	$\frac{7}{8}$–1
India Rubber, Gutta Percha and Tel. Wks. Co., Lim., Ord.....	$18\frac{1}{4}$–$18\frac{3}{4}$	$18\frac{1}{4}$–$18\frac{3}{4}$
Lawes' Chemical Manure Co., Lim., Ord.	5–5½	5–5½
Lever Bros., Lim., 6% Cum. "A" Prefce.....	19/9–20/6	19/6–20/3
Do. 6½% Cum. "B" Prefce.....	20/6–20/9	19/9–20/6
Magadi Soda Co., Lim., Ord.....	17/0–18/0	17/3–18/3
Manganese Bronze & Brass Co., Lim., Ord.	$\frac{11}{16}$–$\frac{13}{16}$	$\frac{11}{16}$–$\frac{13}{16}$
Maypole Dairy Co., Lim., Defd. Ord....	$\frac{31}{32}$–$\frac{33}{32}$	$\frac{31}{32}$–$\frac{33}{32}$
Mond Nickel Co., Lim., 7% Cum. Pref.	1 $\frac{1}{16}$–1 $\frac{3}{16}$	1 $\frac{1}{16}$–1 $\frac{3}{16}$
Do. 7% Non. Cum. Pref.....	$\frac{7}{8}$–1	$\frac{7}{8}$–1
Pacific Phosphate Co., Lim., Ord.....	$4\frac{7}{8}$–$5\frac{1}{8}$	$4\frac{13}{16}$–$5\frac{1}{16}$
Power-Gas Corporation, Lim., Ord.....	$\frac{11}{16}$–$\frac{13}{16}$	$\frac{11}{16}$–$\frac{13}{16}$
Price's Patent Candle Co., Lim.....	91–96	91–96
Salt Union, Lim., Ord.....	32/0–34/0	32/0–34/0
United Alkali Co., Lim., Ord.....	$\frac{1}{4}$–$1\frac{1}{2}$	$1\frac{1}{4}$–$1\frac{1}{2}$
Val de Travers Asphalte Paving Co., Lim.	$\frac{3}{4}$–1	$\frac{3}{4}$–1
Van den Berghs, Lim., Ord.....	$3\frac{1}{8}$–$3\frac{3}{4}$	$3\frac{1}{8}$–$3\frac{5}{8}$
Walkers, Parker & Co., Lim.....	$1\frac{1}{4}$–$1\frac{3}{8}$	$1\frac{1}{4}$–$1\frac{3}{8}$
Welsbach Light Co., Lim.....	$2\frac{1}{4}$–$2\frac{1}{2}$	$2\frac{1}{4}$–$2\frac{3}{8}$

Gas, Iron, Coal and Steel

Gas Light and Coke Co., Ordinary Stock (4% Stand.).....	1 $\frac{11}{16}$–1$\frac{3}{4}$	33/0–34/0
South Metropolitan Gas Co., Ordinary (4% Stand.).....	23/6–24/6	$1\frac{5}{16}$–$1\frac{1}{4}$
Ebbw Vale Steel, Iron & Coal Co., Lim., Ord.....	64–67	64–67
Hadfield's, Limited, Ordinary.....	38/0–40/0	38/0–40/0
Staveley Coal & Iron Co., Lim., Ord....	63–66	64–67
Vickers, Limited, Ordinary.....	1 $\frac{11}{16}$–1 $\frac{13}{16}$	1 $\frac{11}{16}$–1 $\frac{13}{16}$
Armstrong (Sir W. G.) Whitworth, Ltd., Ord.....	33/6–34/6	33/0–34/0

Mines, Nitrate, &c.

Rio Tinto Co., Lim., Ord. (Bearer).....	$14\frac{1}{2}$–$15\frac{1}{2}$	$14\frac{1}{2}$–$15\frac{1}{2}$
Antofagasta Nitrate Co. Compañia de Salitres de Antofagasta) 5½% 1st. Mt. Debs. Red.....	88–93	88–93 ×d
Lagunas Nitrate Co., Lim.....	1–1¼	1–1¼
Tarapaca & Tocopilla Nitrate Co., Lim.	47–49	45–47
Anglo-Chilian Nitrate and Rly. Co., Ltd., Ord.....	14/0–16/0	14/0–16/0

Oil and Rubber

Anglo-Persian Oil Co., Lim., Cum. 6% Part.....	7/7½ –8/1½	7/6–8/0
"Shell" Transport and Trading Co., Lim., Ord.....	$\frac{3}{8}$–$\frac{1}{2}$	$\frac{3}{8}$–$\frac{1}{2}$
Do. 5% Cum. Pref.....	13/9–14/9	13/6–14/0
Anglo-Java Rubber & Produce Co., Lim	1 $\frac{3}{16}$–1 $\frac{5}{16}$	1 $\frac{3}{16}$–1 $\frac{5}{16}$
Anglo-Malay Rubber Co., Lim.....	$17\frac{3}{4}$–$18\frac{1}{4}$ ×d	$16\frac{3}{4}$–$17\frac{1}{4}$
Chersonese (F.M.S.) Estates, Lim.....	4/1½–4/4½	4/0–4/3
Linggi Plantations, Lim., Ord.....		
Mexican Eagle Oil Co., Lim. (Cia Mexicana de Pet. "El Aguila" S.A.) Ordinary	14 $\frac{1}{16}$–13$\frac{27}{32}$	$14\frac{1}{4}$–14
Anglo-Maikop Corporation, Ltd., Ord.	10 $\frac{5}{16}$–10 $\frac{9}{16}$	$10\frac{1}{4}$–$10\frac{1}{2}$
Burmah Oil Co., Ltd., Ord.....	$9\frac{1}{4}$–$9\frac{1}{2}$	9–$9\frac{1}{4}$

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Bankruptcy Information

WHITE, FREDERICK WILLIAM (trading as F. White & Co.), 298A, Commercial Road, and 48, All Saints' Road, Portsmouth, Hants, oil and colour merchant, November 25.

Partnerships Dissolved

CARPER, JOSEPH BURMAN, and FAULKNER, GEORGE AUBREY, oil refiners, Two Waters Mills, Hemel Hempstead, Hertford, under the style of Carper, Faulkner & Co., by mutual consent as from November 17, 1919. All debts received or paid by Joseph Burman Carper.

PRATT, ADRIAN ERNEST, and KING, JOHN HERBERT, oil merchants and composition manufacturers, 48, Colton Street, Leicester, under the style of Pratt & King, by mutual consent as and from October 31, 1919. All debts received and paid by John Herbert King.

Liquidator's Notice

THE NITRATE PRODUCERS' STEAMSHIP CO., LTD. (in liquidation).—A general meeting of members will be held at Billiter Buildings, London, E.C., on December 30, at 11.30 a.m. James A. Walker, Liquidator.

Notice of Dividend

SCOTT, WILLIAM ROBERT, residing and trading at 139, Denton Street, Carlisle, Cumberland, chemist. 13s. 9d., final. December 8. Office of the Official Receiver, 34, Fisher Street, Carlisle.

Order Made on Application for Discharge

LAWS, JOHN JOSEPH, 14, Greyhound Lane, Streatham Common, London, chemist and druggist. Discharge granted subject to the bankrupt consenting to judgment being entered against him by the Official Receiver for the sum of £10. Date of order, October, 20, 1919.

Companies Winding Up Voluntarily

BISSOE TIN SMELTING AND ARSENIC CO., LTD. (in voluntary liquidation).—Creditors' claims on or before January 9, 1920, to the Liquidator, R. B. Petre, C.A., 11, Ironmonger Lane, E.C. 2.

HENRITE EXPLOSIVES, LTD. (in voluntary liquidation).—General meeting of members will be held at 42, Essex Street, Strand, W.C., on Friday, January 2, 1920, at 10 a.m. F. J. Livesey, Liquidator.

THE CASPER OIL AND EXPLORATION CO., LTD.—Mr. Alfred Everard Orbell, of Orbell & Kirk, 151/2, North Street, Brighton, appointed Liquidator. Meeting of creditors at the offices of the Liquidator, on December 15, at 3 p.m.

NITROGEN PRODUCTS AND CARBIDE CO., LTD. (winding up voluntarily for the purpose of amalgamation with Alby United Carbide Factories, Ltd.).—Meeting of creditors at 330, Winchester House, Old Broad Street, E.C., on Monday, December 15, at 2.15 p.m. H. A McMahon, Liquidator.

OXYGEN TRADING CO., LTD.—Mr. John H. Clarke appointed Liquidator.

THE UNITED GAS MANTLE CO., LTD.—Mr. A. W. Griffiths, 52, Queen Victoria Street, E.C., appointed Liquidator. Meeting of creditors at 286, Salisbury House, London Wall, E.C., at 11 a.m., Saturday, December 6, 1919. A. W. Griffiths, Liquidator.

WOHLFAHRT LEAD MINES, LTD.—Messrs. Philip Arthur Scratchley and James Drayson Austen Morris, two of the Directors, appointed joint Liquidators.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, created after July 1, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.]*

Satisfactions

DRAKE & GORHAM, WHOLESALE, LTD. (formerly D. G. ACETYLENE & PETROL GAS CO., LTD., previously FITTINGS LTD. and originally ART FITTINGS LTD.), LONDON, W.C.—Satisfactions registered November 21, £1,000, registered March 23, 1905; £1,000 (not ex.), registered August 22, 1906; and £500 (not ex.), registered October 10, 1907.

RIVERSIDE DYEING AND FINISHING CO., LTD., PENDLETON.—Satisfaction registered Nov. 21, £1,500, registered October 17, 1913.

New Companies Registered

The following list has been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 and 117, Chancery Lane, London, W.C.:—

ABBOTT GLASS CO., LTD., LONDON, S.E.—Registered November 19, £1,000 debentures part of £4,000; general charge. *Nil. October 2, 1918.

ALFRED BISHOP (SUBSIDIARIES), LTD., 48, Spelman Street, Spitalfields, E.—Manufacturing, wholesale and retail chemists and druggists. Nominal Capital, £500 in 500 shares of £1 each. Directors: W. B. Bishop, North Dene, The Park, Beckenham, S.E.; A. Bishop, Sunnyhill, The Ridgway, Wimbledon, S.W.

BARROW HÆMATITE STEEL CO., LTD., BARROW-IN-FURNESS.—Registered November 18, Trust Deed dated November 8, 1919 (supplemental to Trust Deed dated June 10, 1919) for securing £400,000 first debenture stock; general charge. *£661,330. May 14, 1919.

BRANSCOMB'S GLASSWORKS, LTD., 40, Chancery Lane, W.C.—Manufacturers of glass bottles, jars, food containers and other glass receptacles. Nominal Capital, £50,000 in 25,000 Cumulative Preference shares, and 25,000 Ordinary shares of £1 each. Minimum subscriptions, 7 shares. Directors: Br.-General, the Hon. A. E. Dalzell, C.B., Coglan House, Longthorpe, Gloucestershire (Chairman); Phoebe L. Branscomb, 28, Blake Lane, Birmingham (Managing Director); H. G. Branscomb, 25, Blake Lane, Birmingham; H. A. Branscomb, 24, Bordesley Green, Birmingham; W. H. Branscomb, 34, Bordesley Green, Birmingham. Qualification of Directors, £500. Remuneration of Directors, £200 each. Managing Director; £500.

DOPSHINE, LTD., 42, Danes Inn House, 265, Strand, W.C.2.—Manufacturers of colours, dyes, paints and varnish. Nominal Capital, £50,000 in 25,000 Preference shares of £1 each, and 500,000 Ordinary shares of 1s. each. Directors, to be appointed by subscribers. Qualification of Directors, other than first Directors, 1,000 Ordinary shares.

HONDURAS TRUST, LTD.—To acquire asphalte and naphthaline lands, and search for petroleum and other mineral oils. Nominal Capital, £43,000 in 40,000 shares of £1 each, and 60,000 shares of 1s. each. Directors, to be appointed by subscribers. Qualification of Directors, 1 share. Remuneration of Directors, £100 each. Subscribers: P. Veal, 45, Iliffe Street, Walworth, S.E.17.; D. R. Crane, 42, Bromswood Road, Green Lanes, N.4.

MOSSLEY COLOUR AND CHEMICAL CO., LTD.—Quickwood Works, Haddens, Mossley, near Manchester. Manufacturers and Merchants of colours, chemical paints, oil, varnishes and other similar products. Nominal capital, £5,000 in 5,000 shares of £1 each. Directors: W. Marvel; G. Marvel. Qualification of Directors, 1 share. Remuneration of Directors, £100 each.

NIGERIAN HYDRAULIC TIN MINES, LTD.—To develop tin, copper, lead, zinc, coal, iron, gold, silver, diamond and other mines. Nominal capital, £10,000 in 10,000 shares of £1 each. Minimum subscription, 7 shares. Directors to be appointed by subscribers. Remuneration of Directors to be voted by company in general meeting. Subscribers: J. Caldwell, 7, Brunswick Place, Hove, Sussex; H. J. Stephens, 12, Cedars Avenue, Walthamstow, and five others.

PALESTINE OIL INDUSTRY "SHEMEN," LTD., 24, Holborn, E.C.—Nominal capital, £250,000 in 250,000 Ordinary shares of £1 each. Minimum subscribers, £25,000. Directors: Ilia Paenson, 71, Jermyn Street, St. James's, S.W.; Mose Wilbushewich, 71, Jermyn Street, St. James's, S.W. Qualification of Directors, 5,000 shares.

PETROLEUM OIL TRUST, LTD., 17, Farringdon Avenue, E.C.—To carry on the business of producing petroleum and petroleum products. Nominal Capital: £100 in 200 shares of 10s. each. Directors: S. Lee, 12, Chester Terrace, N.W.1.; M. L. I. Browne, Oldhunt, Horsall, Surrey. Qualification of Directors, 1 share.

POWELL & RICKETTS, LTD.—Glass manufacturers, glass drawers, glass rollers and grinders. Nominal Capital, £50,000 in 50,000 Ordinary shares of £1 each. Minimum subscription, 2 per cent. Directors: F. E. Aitkin, Leighton Craigian, near Cardiff; A. E. Balley, 13, Effingham Road, Bristol; J. Myant, 88A, High Street, St. John's Wood; W. M. Penny, 8, Harcourt Road, Bristol; H. C. Riches, 70, Elwyd, Penylan Hill, Cardiff. Qualification of Directors, £500. Remuneration of Directors, £300 each. Chairman, £400.

SANTA MARIA CONSOLIDATED OIL FIELDS, LTD., 1 and 2, Great Winchester Street, E.C.—To acquire any oil, petroleum and mineral bearing lands and carry on the business of producers and refiners of oils and petroleum. Nominal Capital, £500,000 in 1,250,000 shares of 8s. each. Minimum subscriptions, 7 shares. Directors, to be appointed by subscribers. Qualification of Directors, 1,000 shares. Remuneration of Directors, £250 to be divided.

SOZON OIL CO., LTD., MANCHESTER.—Registered November 20, £500 first mortgage debenture, to J. G. Cregan, 102, Alexandra Road, Manchester; general charge.

SOUTH AFRICAN COAL BY-PRODUCTS, LTD., 790–792, Salisbury House, London Wall, E.C.—To buy, sell or deal in coal, coke, tar, pitch, oil, asphaltum, ammonia, dyes or any other residual products. Nominal capital, £6,000 in 4,000 Preference shares of 5s. each and 100,000 Deferred shares of 1s. each. Minimum subscription, 7 shares. Directors: R. W. Mitchell, 149, Auckland Road, S.E. 19; Ellen R. Dolton, 228, Holmsdale Road, South Norwood, S.E. 25; E. C. Barrow, 9, Lower Richmond Road, Mortlake, S.W. 14; and four others. Qualification of Directors, 400 shares. Remuneration of Directors, £200 each; Chairman, £300.

STEADMANS (WEYMOUTH), LTD., 87, St. Thomas Street, Weymouth.—Chemists, photographic manufacturers and dealers. Nominal Capital, £2,000 in 1,000 7½ per cent. Preference shares, and 1,000 Ordinary shares of £1 each. Directors: F. J. Howard, 1, Lyndhurst Terrace, Weymouth; C. H. Bullock, "Summerland," Stavordale Road, Weymouth. Qualification of Directors: £200 in Ordinary shares.

STOURBRIDGE HARDWARE CHEMICAL AND DRYSALTERY CO., LTD., Green Street, Stourbridge. Nominal capital, £5,000 in 5,000 shares of £1 each. Directors: W. G. Blader, Wych Elm, South Avenue, Stourbridge, Managing Director; F. Dean, St. Albans, Lone Lane, Oldmornford, Stourport. Qualification of Directors, 50 shares.

TRINIDAD CONSOLIDATED OILFIELDS, LTD., Registered, November 29, 1919, 13, Copthall Court, E.C.2.—To search for and get petroleum and other oils or products thereof. Nominal Capital, £400,000 in 400,000 shares of £1 each. Minimum subscription, 7 shares. Directors: T. L. Gilmour, 3, Rosecroft Avenue, Hampstead, N.W.; Right Hon. Baron Willoughby de Broke, Compton Verney, Warwick; P. Marsden, 3, London Wall Buildings, E.C.; W. B. Mitford, 2, Kidderpore Avenue, Hampstead, N.W.; R. F. McNair Scott, Borrans, Chobham, Surrey. Qualification of Directors, £250. Remuneration of Directors, £200 each. Chairman, £300.

TYNESIDE PURE PRODUCTS CO., LTD., 26, Mosley Street, Newcastle-upon-Tyne.—Produce manufacturers and manufacturing chemists. Nominal Capital, £3,000 in 3,000 shares of £1 each. Directors: J. West, 89, Gloucester Road, Newcastle-upon-Tyne; F. G. Henderson, 6, West Avenue, Monkseaton. Qualification of Directors, 100 Ordinary shares.

UNITED CHEMICAL CORPORATION, LTD.—Manufacturing, analytical, wholesale and retail chemists, druggists and drysalters. Nominal capital, £100,000 in 200,000 shares of 10s. each. Minimum subscription, 7 shares. Directors to be appointed by subscribers. Qualification of Directors, £1,000. Subscribers: E. T. Church, 38, Solon New Road, Clapham, S.W. 4; J. W. Pollard, 72, Gould Road, Earl's Court, S.W. 10; J. A. Fuller, 65, Hewitt Avenue, Wood Green, N. 22.

WELSH SILICA CO., LTD., CONNAHS QUAY.—Registered November 18, £4,500 debentures (filed under sec. 93 (3) of the Companies (Consolidation) Act, 1908), present issue £1,750; general charge. *£750. May 15, 1918.

WM. BROWNING CO., LTD., Albert Works, Park Street, Camden Town, N.W.1.—Chemists, druggists, chemical manufacturers and dealers. Nominal Capital, £70,000 in 50,000 Preference shares, and 20,000 Ordinary shares of £1 each. Directors, to be appointed by subscribers. Qualification of Directors, £100.

Catalogues Received

MARCLEN PUMPS, LTD., LONDON.—A most interesting development is the centrifugal pump characterised by the absence of glands. The advantages of the pump comprise not only the absence of packing and, therefore, of wear on glands and spindle, but the reduced amount of power required and the fact that the pump is as nearly fool-proof as is practically possible. It is claimed that the Marclen Patent Pump cannot become air-locked, security against this being provided by the annular float valve which automatically regulates the supply of liquid to the pump; the supply can thus be left full on. The weight of the spindle and impeller is taken by a ball thrust bearing and also by a partial hydraulic balance when the pump is working. Very clear diagrams and a table of sizes and outputs are included in the catalogue, which should prove of considerable interest to chemical manufacturers.

GUTHRIE & CO., ACCRINGTON.—Parts IX. and X. of this firm's catalogue give particulars of new developments in this firm's activities, such as cast-iron and brass plant for mixers, drying plant, jacketed vessels, bleaching plant, presses, &c. A large staff of pattern makers is kept in order that special plant to the designs and requirements of customers may be rapidly and economically manufactured. The output, sizes, and advantages of armoured Ceratherm pumps are described in a novel manner, by means of questions and answers received from firms which have sent inquiries, and this should eliminate unnecessary correspondence. These pumps have been is use for nearly two years with almost every conceivable liquid, including hot or cold acids of all strengths, including hydrochloric acid. A novel feature is the absence of leakage at the glands, the liquid being admitted to the pump through the gland, which, being thus under suction, cannot leak